



## TITLE OF THE INVENTION

OCTAHYDRO-2-H-NAPHTHO[1,2-F] INDOLE-4-CARBOXAMIDE  
DERIVATIVES AS SELECTIVE GLUCOCORTICOID RECEPTOR  
MODULATORS

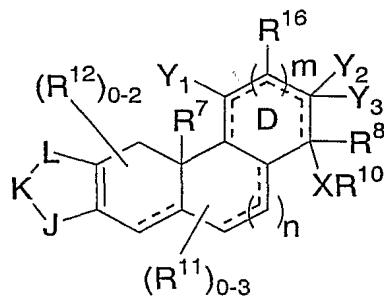
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## BACKGROUND OF THE INVENTION

Intracellular receptors (IR's) are a class of structurally related proteins involved in the regulation of gene expression. The steroid hormone receptors are a subset of this superfamily whose natural ligands are typically comprised of 10 endogenous steroids such as estradiol, progesterone, and cortisol. Man-made ligands to these receptors play an important role in human health and, of these receptors, the glucocorticoid receptor has an essential role in regulating human physiology and immune response. Steroids that interact with the glucocorticoid receptor have been shown to be potent antinflammatory agents. The present invention is directed to a 15 novel class of compounds that are selective glucocorticoid receptor modulators that have potent anti-inflammatory and immunosuppressive activity and possess advantages over steroid glucocorticoid ligands with respect to side effects, efficacy, toxicity and/or metabolism.

## 20 SUMMARY OF THE INVENTION

The present invention encompasses compounds of Formula I:



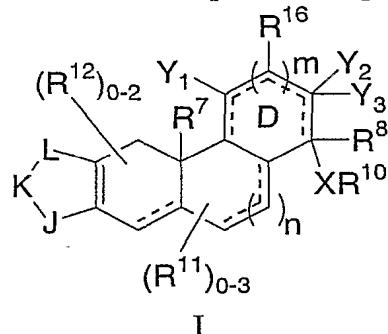
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I

or pharmaceutically acceptable salts or hydrates thereof, which are useful as selective glucocorticoid receptor ligands for treating a variety of autoimmune and inflammatory diseases or conditions. Pharmaceutical compositions and methods of use are also included.

## DETAILED DESCRIPTION OF THE INVENTION

The present invention encompasses compounds of Formula I



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or a pharmaceutically acceptable salt or hydrate thereof, wherein:

n and m are each independently 0, 1 or 2;

10 J is selected from NR<sup>1</sup> or C(R<sup>1</sup>)(R<sup>2</sup>);

K is selected from NR<sup>3</sup> or C(R<sup>3</sup>)(R<sup>4</sup>);

L is selected from NR<sup>5</sup> or C(R<sup>5</sup>)(R<sup>6</sup>);

15

X is a bond, -C(O), -N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-, -C(O)-N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-S(O)<sub>k</sub>-, -N(R<sup>14</sup>)-C(O)-NH- or -S(O)<sub>k</sub>-N(R<sup>14</sup>);

20

k is 0, 1 or 2;

20 R<sup>1</sup> and R<sup>10</sup> are each independently selected from the group consisting of:

25

- (1) C<sub>1-6</sub>alkyl,
- (2) C<sub>2-6</sub>alkenyl,
- (3) C<sub>2-6</sub>akynyl,
- (4) C<sub>3-6</sub>cycloalkyl,
- (5) C<sub>1-6</sub>alkoxy,
- (6) C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (7) aryl,

- (8) aryl C<sub>1-6</sub>alkyl,
- (9) HET,
- (10) -C<sub>1-6</sub>alkyl-HET,
- (11) aryloxy,
- 5 (12) aroyloxy,
- (13) aryl C<sub>2-6</sub>alkenyl,
- (14) aryl C<sub>2-6</sub>alkynyl,
- (15) hydrogen,
- (16) hydroxyl and
- 10 (17) cyano,

wherein items (1) to (6) above and the alkyl portions of items (8) and (10) above and the alkenyl portion of item (13) above and the alkynyl portion of item (14) above are optionally substituted from one up to the maximum number of substitutable positions  
15 with a substituent independently selected from the group consisting of: halo, oxo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, C<sub>3-6</sub>cycloalkyl and C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2, and

wherein items (7), (9), (11) and (12) above and aryl portion of items (8), (13) and (14) above and the HET portion of item (10) above are optionally substituted from one up  
20 to the maximum number of substitutable positions with a substituent independently selected from the group consisting of:

- (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- 25 (d) C<sub>1-6</sub>alkyl,
- (e) C<sub>2-6</sub>alkenyl,
- (f) C<sub>2-6</sub>alkynyl,
- (g) C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (h) aryl,
- 30 (i) aryl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (j) HET,
- (k) aryl C<sub>1-6</sub>alkyl,
- (l) aroyl,
- (m) aryloxy,

- (n) aryl C<sub>1</sub>-6alkoxy,
- (o) CN and
- (p) C<sub>3</sub>-6cycloalkyl,

5 wherein items (d) to (g) and (p) above and the alkyl portions of item (k) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sub>13</sub> and N(R<sup>14</sup>)<sub>2</sub>, and

10 wherein items (h), (i), (j), (l) and (m) above and the aryl portions of items (k) and (n) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sub>13</sub> and C<sub>1</sub>-4alkyl,

15 R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>6</sup> are each independently selected from the group consisting of:

- (1) hydrogen,
- (2) halo,
- (3) C<sub>1</sub>-6alkyl,
- (4) C<sub>2</sub>-6alkenyl,
- 20 (5) C<sub>2</sub>-6akynyl,
- (6) C<sub>3</sub>-6cycloalkyl,
- (7) C<sub>1</sub>-6alkoxy,
- (8) C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (9) aryl,
- 25 (10) aryl C<sub>1</sub>-6alkyl,
- (11) HET and
- (12) -C<sub>1</sub>-6alkyl-HET,

30 wherein items (3) to (8) above and the alkyl portions of items (10) and (12) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sub>13</sub>, N(R<sup>14</sup>)<sub>2</sub> and C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2; and

wherein items (9) and (11) and the aryl portion of items (10) and the HET portion of item (12) are optionally substituted from one up to the maximum number of

substitutable positions with a substituent independently selected from the group consisting of:

- 5 (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- (d) C<sub>1-6</sub>alkyl,
- (e) C<sub>2-6</sub>alkenyl,
- (f) C<sub>2-6</sub>akynyl and
- (g) C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,

10 wherein items (d) to (g) above are optionally substituted with from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>,

15 or R<sup>1</sup> and R<sup>3</sup> or R<sup>3</sup> and R<sup>5</sup> may be joined together to form a double bond;

15 R<sup>7</sup> is selected from the group consisting of:

- 20 (1) hydrogen,
- (2) OR<sup>13</sup>,
- (3) C<sub>1-4</sub>alkyl,
- (4) aryl and
- (5) aryl C<sub>1-4</sub>alkyl,

25 wherein item (3) above and the alkyl portion of item (5) above are optionally substituted with from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

30 wherein item (4) above and the aryl portion of item (5) above are optionally substituted with from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of:

- 35 (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- (d) C<sub>1-6</sub>alkyl,
- (e) C<sub>2-6</sub>alkenyl and

(f) C<sub>2-6</sub>akynyl,

wherein items (d) to (f) above are optionally substituted with from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sub>13</sub> and N(R<sub>14</sub>)<sub>2</sub>;

5

each Y<sub>1</sub>, Y<sub>2</sub> and Y<sub>3</sub> are independently selected from the group consisting of:

- (1) hydrogen,
- (2) -O-R<sup>9</sup>,
- (3) -S(O)<sub>k</sub>-R<sup>9</sup>, wherein k is 0, 1 or 2,
- 10 (4) -C-W-R<sup>9</sup>, wherein W is O or S(O)<sub>k</sub>,
- (5) -N(R<sup>15</sup>)<sub>2</sub>,
- (6) -S(O)<sub>k</sub>-N(R<sup>15</sup>)<sub>2</sub>,
- (7) -N(R<sup>15</sup>)-S(O)<sub>k</sub>-N(R<sup>15</sup>)<sub>2</sub>,
- (8) NO<sub>2</sub>,
- 15 (9) -C(O)-R<sup>15</sup>,
- (10) -C(O)O-R<sup>15</sup>,
- (11) -CN,
- (12) halo,
- (13) -O-S(O)<sub>k</sub>-R<sup>15</sup> and
- 20 (14) C<sub>1-4</sub>alkyl, optionally substituted with from 1 to 6 halo groups,

with the proviso that when Y<sub>2</sub> is hydrogen, Y<sub>3</sub> is -C(O)-R<sup>15</sup>, R<sup>15</sup> is C<sub>1-6</sub>alkyl and X is -C(O) then R<sup>10</sup> is not C<sub>1-6</sub>alkyl, and

25

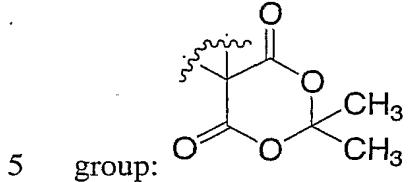
with the proviso that when Y<sub>2</sub> is -C(O)-R<sup>15</sup>, Y<sub>3</sub> is hydrogen, R<sup>15</sup> is C<sub>1-6</sub>alkyl and X is -C(O) then R<sup>10</sup> is not C<sub>1-6</sub>alkyl, and

30

with the proviso that when Y<sub>2</sub> and Y<sub>3</sub> are both hydrogen, X is a bond and R<sup>10</sup> is

HET, then said HET is defined as a 5-membered aromatic or non-aromatic monocyclic ring containing 1-3 heteroatoms selected from O, S and N,

R<sup>8</sup> is selected from the group consisting of: hydrogen, C<sub>1</sub>-6alkyl, C<sub>1</sub>-6alkoxy, -C<sub>1</sub>-6alkyl-C(O)OH and -C<sub>1</sub>-6alkyl-C(O)O-C<sub>1</sub>-6alkyl, wherein the C<sub>1</sub>-6alkyl portion is optionally mono, di or tri substituted with halo; or where R<sup>8</sup> and -XR<sup>10</sup> together with the carbon atom to which they are attached form the spiro



R<sup>9</sup> is selected from the group consisting of: hydrogen, C<sub>1</sub>-12alkyl and aryl, wherein C<sub>1</sub>-12alkyl and aryl are optionally substituted from one up to the maximum number of substituents with halo;

10

each R<sup>11</sup>, R<sup>12</sup> and R<sup>16</sup> is independently selected from the group consisting of:

- (1) hydrogen,
- (2) halo,
- (3) C<sub>1</sub>-6alkyl,
- 15 (4) C<sub>2</sub>-6alkenyl,
- (5) C<sub>1</sub>-6alkoxy and
- (6) hydroxy,

20 wherein items (3) to (5) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>12</sup>, N(R<sup>13</sup>)<sub>2</sub> and C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,

25 or R<sup>16</sup> may additionally be hydrogen;

25

each R<sup>13</sup> and R<sup>14</sup> is independently selected from the group consisting of hydrogen and C<sub>1</sub>-4alkyl, optionally substituted from one up to the maximum number of substitutable positions with halo; and

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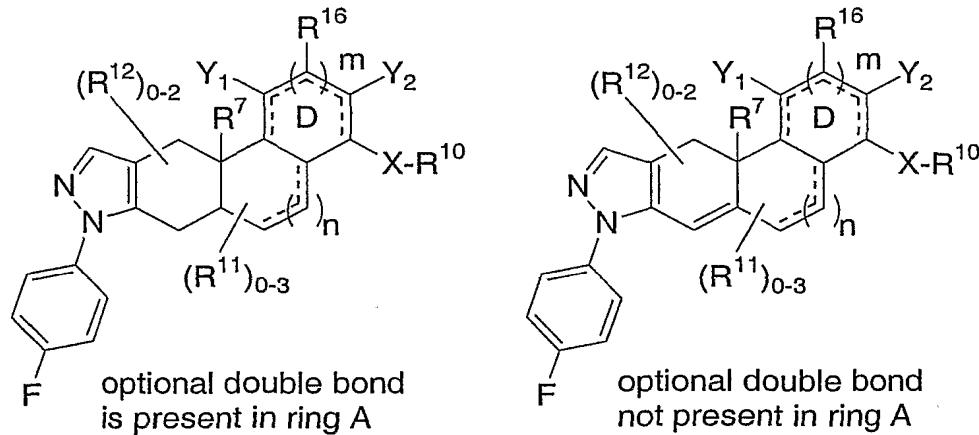
each R<sup>15</sup> is independently selected from the group consisting of: hydrogen, C<sub>1</sub>-6alkyl, aryl and C<sub>1</sub>-12alkoxycarbonyl, wherein said C<sub>1</sub>-6alkyl and C<sub>1</sub>-

12alkoxycarbonyl are optionally substituted from one up to the maximum number of substitutable positions with halo and said aryl is optionally substituted from one up to the maximum number of substitutable positions with halo and C<sub>1</sub>-4alkyl, optionally substituted with 1-3 halo groups.

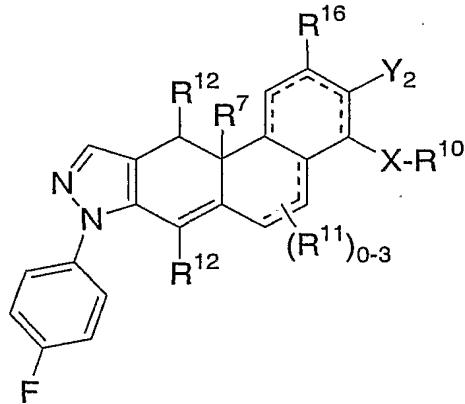
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In an alternative embodiment X-R<sup>10</sup> may be CN.

10 The optional double bond shown in ring A of the compound of Formula I is depicted as a dotted line and means that the double bond may or may not be present. This is illustrated below for a sub-set of compounds within Formula I:

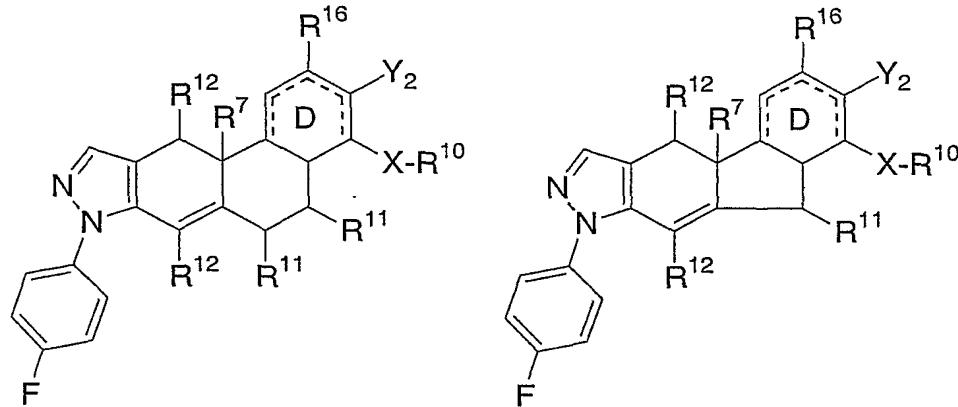


15 The substituent R<sup>12</sup> in Formula I may or may not be present. When present, one or two R<sup>12</sup> groups may occupy the positions illustrated below:



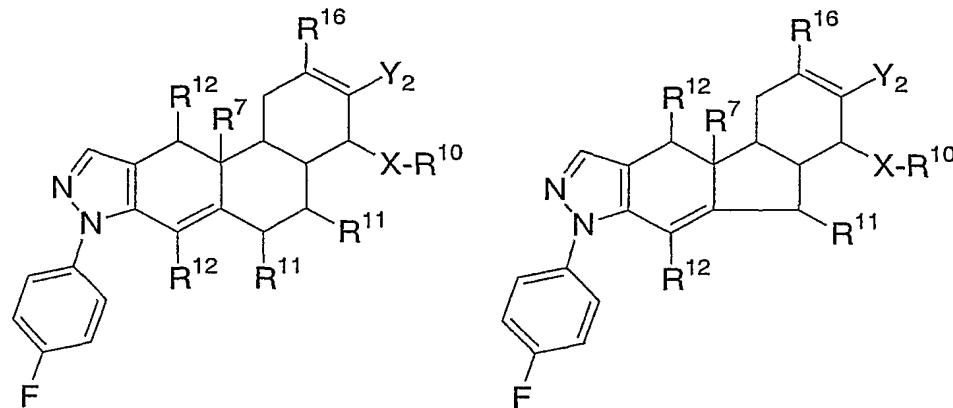
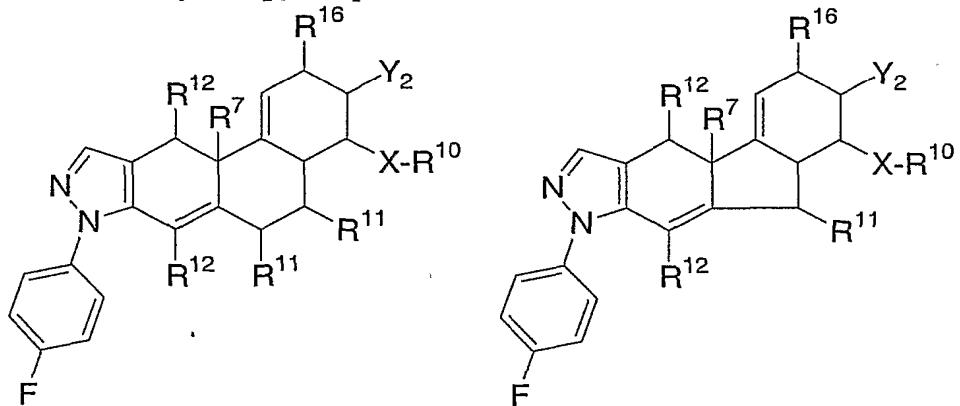
Two R<sup>12</sup> groups may also reside on the same carbon atom.

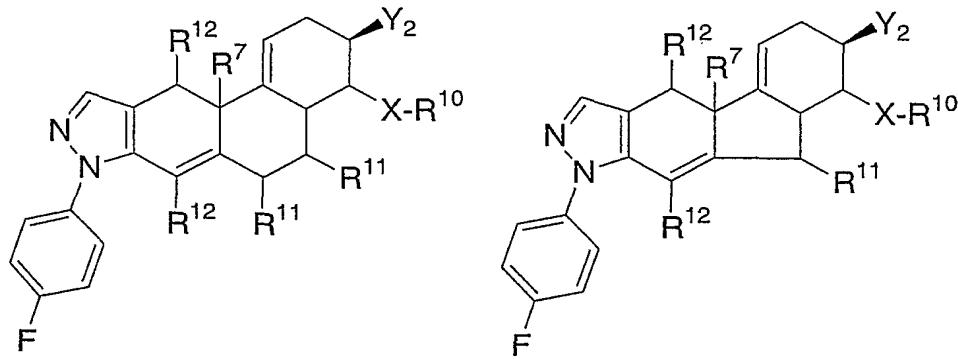
The substituent R<sup>11</sup> in Formula I may or may not be present. When present, one, two or three R<sup>11</sup> groups may occupy the positions illustrated below:



5 Two R<sup>11</sup> groups may also reside on the same carbon atom.

The optional double bonds show in ring D of the compound of Formula I may occupy the positions illustrated below:





An embodiment of the invention encompasses a genus of compounds of Formula I wherein:

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J is NR<sup>1</sup>;

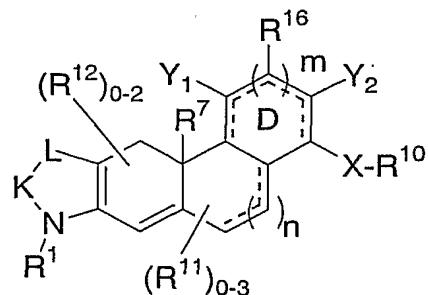
K is NR<sup>3</sup>;

10 L is C(R<sup>5</sup>)(R<sup>6</sup>); and

R<sup>3</sup> and R<sup>5</sup> are joined together to form a double bond.

15

An embodiment of the invention encompasses a genus of compounds of Formula I, herein identified as compounds of Formula Ia:



20

Ia

Within the genus of compounds of Formula Ia is the sub-genus of compounds wherein:

R1 is phenyl or pyridyl said phenyl or pyridyl or optionally mono or di- substituted with a substituent independently selected from the group consisting of:

5 (a) halo,  
(b) OCH<sub>3</sub>,  
(d) CH<sub>3</sub>,  
(e) CN.

10 Within this sub-genus of compounds is the class of compounds wherein R1 is phenyl, optionally mono or di-substituted with halo.

Within the genus of compounds of Formula Ia are the compounds wherein Y1 is hydrogen.

15 Also within the genus of compounds of Formula Ia are the compounds wherein R16 is hydrogen.

20 Also within the genus of compounds of Formula Ia are the compounds wherein R7 is methyl.

Also within the genus of compounds of Formula Ia are the compounds wherein Y1 is hydrogen and R12 is hydrogen.

An embodiment of the invention encompasses compounds of Formula I and Formula Ia wherein:

25 X is a bond, -C(O), -N(R14)-, -N(R14)-C(O)-, -C(O)-N(R14)-, -N(R14)-C(O)-NH- ; and

R14 is hydrogen or methyl.

An embodiment of the invention encompasses compounds of Formula I and Formula Ia wherein:

30 X is a bond, -C(O), -N(R14)-, -N(R14)-C(O)-, -C(O)-N(R14)-, -N(R14)-C(O)-NH- ; Y1 is hydrogen;

R1 is phenyl, optionally mono or di-substituted with halo;

R7 is methyl.

R11 is hydrogen;

35 R12 is hydrogen;

R<sup>14</sup> is hydrogen or methyl;

R<sup>16</sup> is hydrogen; and

R<sup>10</sup> are each independently selected from the group consisting of:

- (1) C<sub>1</sub>-4alkyl,
- 5 (2) C<sub>2</sub>-4alkenyl,
- (3) C<sub>2</sub>-4akynyl,
- (4) C<sub>3</sub>-6cycloalkyl,
- (5) C<sub>1</sub>-4alkoxy,
- (6) aryl,
- 10 (7) aryl C<sub>1</sub>-4alkyl,
- (8) HET,
- (9) -C<sub>1</sub>-4alkyl-HET,
- (10) aryloxy,
- (11) aroyloxy,
- 15 (12) aryl C<sub>2</sub>-4alkenyl,
- (13) aryl C<sub>2</sub>-6alkynyl,

wherein items (1) to (5) above and the alkyl portions of items (7) and (9) above and the alkenyl portion of item (12) above and the alkynyl portion of item (13) above are 20 optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, C<sub>3</sub>-6cycloalkyl and C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2, and

25 wherein items (6), (8), (10) and (11) above and aryl portion of items (7), (12) and (13) above and the HET portion of item (9) above are optionally substituted with from one to three substituents independently selected from the group consisting of:

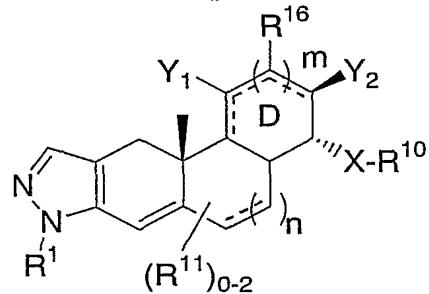
- (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- 30 (d) C<sub>1</sub>-4alkyl,
- (e) C<sub>2</sub>-4alkenyl,
- (f) C<sub>2</sub>-4akynyl,
- (g) aryl,
- (h) HET,

- (i) aryl C<sub>1</sub>-6alkyl,
- (j) aroyl,
- (k) aryloxy,
- (l) aryl C<sub>1</sub>-6alkoxy and
- 5 (m) CN,

wherein items (d) to (f) above and the alkyl portions of item (i) above are optionally substituted from with one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

10 wherein items (g), (h), (j) and (k) above and the aryl portions of items (i) and (l) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and C<sub>1</sub>-4alkyl,

15 Another embodiment of the invention encompasses a genus of compounds of Formula I, herein identified as compounds of Formula Ib:



Ib

wherein:

20 m is 0 or 1,

n is 0 or 1,

R<sup>1</sup> is phenyl, optionally mono or di-substituted with halo;

R<sup>10</sup> are each independently selected from the group consisting of:

- (1) C<sub>1</sub>-6alkyl,
- (2) C<sub>2</sub>-6alkenyl,
- (3) C<sub>2</sub>-6akynyl,
- (4) C<sub>3</sub>-6cycloalkyl,
- (5) C<sub>1</sub>-6alkoxy,
- 25 (6) C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,

- (7) aryl,
- (8) aryl C<sub>1-6</sub>alkyl,
- (9) HET,
- (10) -C<sub>1-6</sub>alkyl-HET,
- 5 (11) aryloxy,
- (12) aroyloxy,
- (13) aryl C<sub>2-6</sub>alkenyl,
- (14) aryl C<sub>2-6</sub>alkynyl,
- (15) hydrogen, and
- 10 (16) hydroxy

wherein items (1) to (6) above and the alkyl portions of items (8) and (10) above and the alkenyl portion of item (13) above and the alkynyl portion of item (14) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, C<sub>3-6</sub>cycloalkyl and C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2, and

wherein items (7), (9), (11) and (12) above and aryl portion of items (8), (13) and (14) above and the HET portion of item (10) above are optionally substituted with from 20 one to three substituents independently selected from the group consisting of:

- (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- (d) C<sub>1-6</sub>alkyl,
- 25 (e) C<sub>2-6</sub>alkenyl,
- (f) C<sub>2-6</sub>alkynyl,
- (g) C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (h) aryl,
- (i) aryl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- 30 (j) HET,
- (k) aryl C<sub>1-6</sub>alkyl,
- (l) aroyl,
- (m) aryloxy,
- (n) aryl C<sub>1-6</sub>alkoxy and
- 35 (o) CN,

wherein items (d) to (g) above and the alkyl portions of item (k) above are optionally substituted from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

5 wherein items (h), (i), (j), (l) and (m) above and the aryl portions of items (k) and (n) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and C<sub>1-4</sub>alkyl, each R<sup>13</sup> and R<sup>14</sup> is independently selected from the group consisting of hydrogen and C<sub>1-4</sub>alkyl, optionally substituted from one to three halo groups;

10 R<sup>16</sup> and each R<sup>11</sup> are independently selected from the group consisting of:

- (1) hydrogen,
- (2) halo,
- (3) methyl,
- (4) methoxy, and
- 15 (5) hydroxy;

Y<sub>1</sub> and Y<sub>2</sub> are each selected from the group consisting of:

- (1) hydrogen,
- (2) hydroxy,
- (3) halo,
- 20 (4) methyl,
- (5) -NO<sub>2</sub>,
- (6) -CN,
- (7) mono, di or tri halo substituted methyl,

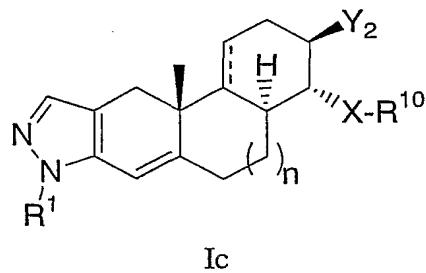
X is a bond, -C(O), -N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-, -C(O)-N(R<sup>14</sup>)-,

25 -N(R<sup>14</sup>)-S(O)<sub>k</sub>-, -N(R<sup>14</sup>)-C(O)-NH- or -S(O)<sub>k</sub>-N(R<sup>14</sup>);

Within Formula Ib, there is the sub-genus of compounds wherein Y<sub>1</sub>, R<sup>11</sup> and R<sup>16</sup> are each hydrogen.

Within Formula Ib, there is a sub-genus of compounds herein

30 identified as Formula Ic:



wherein

n is 0 or 1,

5 R<sup>1</sup> is phenyl, optionally mono or di-substituted with halo;

R<sup>10</sup> is selected from the group consisting of:

- (1) C<sub>1</sub>-6alkyl,
- (2) C<sub>2</sub>-6alkenyl,
- (3) C<sub>2</sub>-6akynyl,
- 10 (4) C<sub>3</sub>-6cycloalkyl,
- (5) C<sub>1</sub>-6alkoxy,
- (6) C<sub>1</sub>-6alkyl-S(O)<sub>k</sub><sup>-</sup>, wherein k is 0, 1 or 2,
- (7) aryl,
- (8) aryl C<sub>1</sub>-6alkyl,
- 15 (9) HET,
- (10) -C<sub>1</sub>-6alkyl-HET,
- (11) aryloxy,
- (12) aroyloxy,
- (13) aryl C<sub>2</sub>-6alkenyl,
- 20 (14) aryl C<sub>2</sub>-6alkynyl,
- (15) hydrogen, and
- (16) hydroxy

wherein items (1) to (6) above and the alkyl portions of items (8) and (10) above and the alkenyl portion of item (13) above and the alkynyl portion of item (14) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, C<sub>3</sub>-6cycloalkyl and C<sub>1</sub>-6alkyl-S(O)<sub>k</sub><sup>-</sup>, wherein k is 0, 1 or 2, and

wherein items (7), (9), (11) and (12) above and aryl portion of items (8), (13) and (14) above and the HET portion of item (10) above are substituted with from one to three substituents independently selected from the group consisting of:

- 5 (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- (d) C<sub>1-6</sub>alkyl,
- (e) C<sub>2-6</sub>alkenyl,
- (f) C<sub>2-6</sub>akynyl,
- 10 (g) C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (h) aryl,
- (i) aryl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (j) HET,
- (k) aryl C<sub>1-6</sub>alkyl,
- 15 (l) aroyl,
- (m) aryloxy,
- (n) aryl C<sub>1-6</sub>alkoxy and
- (o) CN,

wherein items (d) to (g) above and the alkyl portions of item (k) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

20 wherein items (h), (i), (j), (l) and (m) above and the aryl portions of items (k) and (n) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and C<sub>1-4</sub>alkyl,

25 each R<sup>13</sup> and R<sup>14</sup> is independently selected from the group consisting of hydrogen and C<sub>1-4</sub>alkyl, optionally substituted with from one up to three halo groups;

R<sup>16</sup> and each R<sup>11</sup> are independently selected from the group consisting of:

- 30 (1) hydrogen,
- (2) halo,
- (3) methyl,
- (4) methoxy, and
- (5) hydroxy;

Y<sub>1</sub> and Y<sub>2</sub> are each selected from the group consisting of:

35 (1) hydrogen,

- (2) hydroxy,
- (3) halo,
- (4) methyl,
- (5)  $-\text{NO}_2$ ,
- 5 (6)  $-\text{CN}$ ,
- (6) mono, di or tri halo substituted methyl,

X is a bond,  $-\text{C}(\text{O})$ ,  $-\text{N}(\text{R}^{14})-$ ,  $-\text{N}(\text{R}^{14})-\text{C}(\text{O})-$ ,  $-\text{C}(\text{O})-\text{N}(\text{R}^{14})-$ ,  $-\text{N}(\text{R}^{14})-\text{S}(\text{O})_k-$ ,  $-\text{N}(\text{R}^{14})-\text{C}(\text{O})-\text{NH}-$  or  $-\text{S}(\text{O})_k-\text{N}(\text{R}^{14})$ ;

10 Within this sub-genus of Formula Ic there is a class of compounds  
wherein:

X is a bond,  $-\text{C}(\text{O})$ ,  $-\text{N}(\text{R}^{14})-$ ,  $-\text{N}(\text{R}^{14})-\text{C}(\text{O})-$ ,  $-\text{C}(\text{O})-\text{N}(\text{R}^{14})-$ ,  $-\text{N}(\text{R}^{14})-\text{C}(\text{O})-\text{NH}-$  ;  
R<sup>13</sup> and R<sup>14</sup> are each independently selected from hydrogen or methyl; and

15 R<sup>10</sup> are each independently selected from the group consisting of:

- (1) C<sub>1-4</sub>alkyl,
- (2) C<sub>2-4</sub>alkenyl,
- (3) C<sub>2-4</sub>akynyl,
- (4) C<sub>3-6</sub>cycloalkyl,
- 20 (5) C<sub>1-4</sub>alkoxy,
- (6) aryl,
- (7) aryl C<sub>1-4</sub>alkyl,
- (8) HET,
- (9)  $-\text{C}_{1-4}\text{alkyl}-\text{HET}$ ,
- 25 (10) aryloxy,
- (11) aroyloxy,
- (12) aryl C<sub>2-4</sub>alkenyl,
- (13) aryl C<sub>2-6</sub>alkynyl,

30 wherein items (1) to (5) above and the alkyl portions of items (7) and (9) above and the alkenyl portion of item (12) above and the alkynyl portion of item (13) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, C<sub>3-6</sub>cycloalkyl and C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2, and

wherein items (6), (8), (10) and (11) above and aryl portion of items (7), (12) and (13) above and the HET portion of item (9) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of:

- 5 (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- (d) C<sub>1-4</sub>alkyl,
- (e) C<sub>2-4</sub>alkenyl,
- 10 (f) C<sub>2-4</sub>akynyl,
- (g) aryl,
- (h) HET,
- (i) aryl C<sub>1-6</sub>alkyl,
- (j) aroyl,
- 15 (k) aryloxy,
- (l) aryl C<sub>1-6</sub>alkoxy and
- (m) CN,

wherein items (d) to (f) above and the alkyl portions of item (i) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

25 wherein items (g), (h), (j) and (k) above and the aryl portions of items (i) and (l) above are optionally substituted with from one to three substituents independently selected independently selected from the group consisting of: halo, OR<sup>13</sup> and C<sub>1-4</sub>alkyl.

Within this class of compounds of Formula Ic is a sub-class of compounds wherein:

X is a bond, -C(O), -N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-, -C(O)-N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-NH- ; R<sup>13</sup> and R<sup>14</sup> are each independently from hydrogen or methyl; and

30 R<sup>10</sup> are each independently selected from the group consisting of:

- (1) C<sub>3-6</sub>cycloalkyl,
- (2) aryl,
- (3) aryl C<sub>1-4</sub>alkyl,
- (4) HET,
- 35 (5) -C<sub>1-4</sub>alkyl-HET,

(6) aryl C<sub>2</sub>-4alkenyl,

wherein item (1) above and the alkyl portions of items (3) and (5) above and the alkenyl portion of item (8) above are optionally substituted with from one to three  
5 substituents independently selected from the group consisting of: halo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, and

wherein the aryl portion of items (2), (3), (6) and the HET portion of item (4) and (5) above are optionally substituted with from one to three substituents independently selected from the group consisting of:

- 10 (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- (d) C<sub>1</sub>-4alkyl,
- (e) C<sub>2</sub>-4alkenyl,
- 15 (f) C<sub>2</sub>-4akynyl,
- (g) aryl,
- (h) HET,
- (i) aryl C<sub>1</sub>-6alkyl,
- (j) aroyl,
- 20 (k) aryloxy,
- (l) aryl C<sub>1</sub>-6alkoxy and
- (m) CN,

wherein items (d) to (f) above and the alkyl portions of item (i) above are optionally substituted with from one to three substituents independently selected from the group  
25 consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

wherein items (g), (h), (j) and (k) above and the aryl portions of items (i) and (l) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and C<sub>1</sub>-4alkyl.

30 Within this subclass of compounds of Formula Ic are the compounds  
wherein:  
R<sup>10</sup> are each independently selected from the group consisting of:  
(1) C<sub>3</sub>-6cycloalkyl,

5 (2) aryl,  
 (3) aryl C<sub>1-4</sub>alkyl,  
 (4) HET,  
 (5) -C<sub>1-4</sub>alkyl-HET,  
 (6) aryl C<sub>2-4</sub>alkenyl,

wherein item (1) above and the alkyl portions of items (3) and (5) above and the alkenyl portion of item (8) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, and

10 wherein the HET portion of item (4) and (5) are optionally substituted with from one to three substituents selected from the group consisting of C<sub>1-4</sub>alkyl and aryl, and

15 wherein the aryl portion of items (2), (3), (6) above are optionally substituted with from one to three substituents independently selected from the group consisting of:

20	(a) halo,
	(b) OR <sup>13</sup> ,
	(c) N(R <sup>14</sup> ) <sub>2</sub> ,
	(d) C <sub>1-4</sub> alkyl,
	(e) C <sub>2-4</sub> alkenyl,
	(f) C <sub>2-4</sub> akynyl,
	(g) aryl,
	(h) HET,
	(i) aryl C <sub>1-6</sub> alkyl,
25	(j) aroyl,
	(k) aryloxy,
	(l) aryl C <sub>1-6</sub> alkoxy and
	(m) CN,

30 wherein items (d) to (f) above and the alkyl portions of item (i) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

35 wherein items (g), (h), (j) and (k) above and the aryl portions of items (i) and (l) above  
are optionally substituted from one up to the maximum number of substitutable

positions with a substituent independently selected from the group consisting of: halo, OR<sub>13</sub> and C<sub>1-4</sub>alkyl.

Another embodiment of the invention encompasses a compound of  
5 Formula Ia wherein Y<sub>2</sub> is CF<sub>3</sub>. Within this embodiment R<sub>10</sub> is selected from the group consisting of:

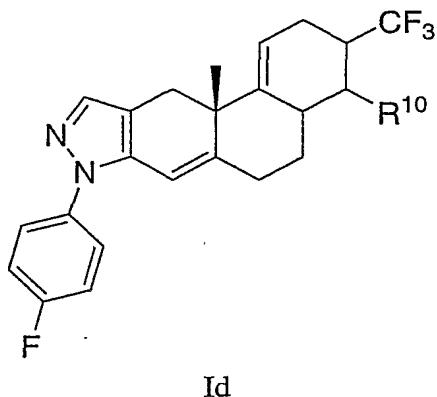
- (1) phenyl,
- (2) benzyl, and
- (3) HET, wherein HET is a 5-membered aromatic or non-aromatic  
10 monocyclic ring containing 1-3 heteroatoms selected from O, S and N,

wherein groups (1) to (3) above are optionally substituted with 1 to 3 substituents independently selected from the group consisting of:

- 15 (a) halo,
- (b) C<sub>1-4</sub>alkyl, optionally substituted with hydroxy or 1 to 3 halo groups,
- (c) C<sub>1-4</sub>alkoxy, optionally substituted with 1 to 3 halo groups,
- 20 (d) NH<sub>2</sub>,
- (e) hydroxy, and
- (e) phenyl or benzyl.

Another embodiment of the invention encompasses a compound of  
25 Formula Ia wherein Y<sub>2</sub> is hydrogen, X is a bond and R<sub>10</sub> is HET, wherein HET is a 5-membered aromatic or non-aromatic monocyclic ring containing 1-3 heteroatoms selected from O, S and N. Within this embodiment HET is selected from oxazolyl and imidazolyl.

Another embodiment of the invention encompasses a compound of  
30 Formula Id



or a pharmaceutically acceptable salt thereof, wherein

5

R10 is a 5-membered aromatic or non-aromatic mono-cyclic ring containing 1-3 heteroatoms selected from O, S, and N, and

10 R10 is mono-substituted with phenyl, wherein phenyl is optionally substituted with 1-3 substituents independently selected from halo, C<sub>1</sub>-4alkyl and C<sub>1</sub>-4alkoxy. Within this embodiment R10 is oxazolyl, oxadiazolyl or thiazolyl. Also within this embodiment R10 is oxazolyl.

15 Another embodiment of the invention encompasses a pharmaceutical composition comprising a compound of Formula I in combination with a pharmaceutically acceptable carrier.

20 Another embodiment of the invention encompasses a method for treating a glucocorticoid receptor mediated disease or condition in a mammalian patient in need of such treatment comprising administering the patient a compound of Formula I in an amount that is effective for treating the glucocorticoid receptor mediated disease or condition.

25 Within this embodiment is encompassed the above method wherein the glucocorticoid receptor mediated disease or condition is selected from the group consisting of: tissue rejection, leukemias, lymphomas, Cushing's syndrome, acute adrenal insufficiency, congenital adrenal hyperplasia, rheumatic fever, polyarteritis nodosa, granulomatous polyarteritis, inhibition of myeloid cell lines, immune proliferation/apoptosis, HPA axis suppression and regulation, hypercortisolemia, stroke and spinal cord injury, hypercalcemia, hyperglycemia, acute adrenal

insufficiency, chronic primary adrenal insufficiency, secondary adrenal insufficiency, congenital adrenal hyperplasia, cerebral edema, thrombocytopenia, Little's syndrome, obesity, metabolic syndrome, inflammatory bowel disease, systemic lupus erythematosus, polyartitis nodosa, Wegener's granulomatosis, giant cell arteritis, 5 rheumatoid arthritis, juvenile rheumatoid arthritis, uveitis, hay fever, allergic rhinitis, urticaria, angioneurotic edema, chronic obstructive pulmonary disease, asthma, tendonitis, bursitis, Crohn's disease, ulcerative colitis, autoimmune chronic active hepatitis, organ transplantation, hepatitis, cirrhosis, inflammatory scalp alopecia, panniculitis, psoriasis, discoid lupus erythematosus, inflamed cysts, atopic dermatitis, 10 pyoderma gangrenosum, pemphigus vulgaris, buflous pernphigoid, systemic lupus erythematosus, dermatomyositis, herpes gestationis, eosinophilic fasciitis, relapsing polychondritis, inflammatory vasculitis, sarcoidosis, Sweet's disease, type I reactive leprosy, capillary hemangiomas, contact dermatitis, atopic dermatitis, lichen planus, exfoliative dermatitus, erythema nodosum, acne, hirsutism, toxic epidermal 15 necrolysis, erythema multiform, cutaneous T-cell lymphoma, Human Immunodeficiency Virus (HIV), cell apoptosis, cancer, Kaposi's sarcoma, retinitis pigmentosa, cognitive performance, memory and learning enhancement, depression, addiction, mood disorders, chronic fatigue syndrome, schizophrenia, sleep disorders, and anxiety.

20 Another embodiment of the invention encompasses a method of selectively modulating the activation, repression, agonism and antagonism effects of the glucocorticoid receptor in a mammal comprising administering to the mammal a compound of Formula I in an amount that is effective to modulate the glucocorticoid receptor.

25 Exemplifying the invention are the compounds of the Examples disclosed hereunder.

The invention is described using the following definitions unless otherwise indicated.

The term "halogen" or "halo" includes F, Cl, Br, and I.

30 The term "alkyl" means linear or branched structures and combinations thereof, having the indicated number of carbon atoms. Thus, for example, C<sub>1</sub>-6alkyl includes methyl, ethyl, propyl, 2-propyl, s- and t-butyl, butyl, pentyl, hexyl, 1,1-dimethylethyl, cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl.

The term "alkoxy" means alkoxy groups of a straight, branched or cyclic configuration having the indicated number of carbon atoms. C<sub>1</sub>-6alkoxy, for example, includes methoxy, ethoxy, propoxy, isopropoxy, and the like.

5 The term "alkylthio" means alkylthio groups having the indicated number of carbon atoms of a straight, branched or cyclic configuration. C<sub>1</sub>-6alkylthio, for example, includes methylthio, propylthio, isopropylthio, and the like.

10 The term "alkenyl" means linear or branched structures and combinations thereof, of the indicated number of carbon atoms, having at least one carbon-to-carbon double bond, wherein hydrogen may be replaced by an additional carbon-to-carbon double bond. C<sub>2</sub>-6alkenyl, for example, includes ethenyl, propenyl, 1-methylethenyl, butenyl and the like.

15 The term "alkynyl" means linear or branched structures and combinations thereof, of the indicated number of carbon atoms, having at least one carbon-to-carbon triple bond. C<sub>3</sub>-6alkynyl, for example, includes , propenyl, 1-methylethenyl, butenyl and the like.

20 The term "cycloalkyl" means mono-, bi- or tri-cyclic structures, optionally combined with linear or branched structures, the indicated number of carbon atoms. Examples of cycloalkyl groups include cyclopropyl, cyclopentyl, cycloheptyl, adamantyl, cyclododecylmethyl, 2-ethyl-1- bicyclo[4.4.0]decyl, and the like.

The term "aryl" is defined as a mono- or bi-cyclic aromatic ring system and includes, for example, phenyl, naphthyl, and the like.

25 The term "aralkyl" means an alkyl group as defined above of 1 to 6 carbon atoms with an aryl group as defined above substituted for one of the alkyl hydrogen atoms, for example, benzyl and the like.

The term "aryloxy" means an aryl group as defined above attached to a molecule by an oxygen atom (aryl-O) and includes, for example, phenoxy, naphthoxy and the like.

30 The term "aralkoxy" means an aralkyl group as defined above attached to a molecule by an oxygen atom (aralkyl-O) and includes, for example, benzyloxy, and the like.

The term "arylthio" is defined as an aryl group as defined above attached to a molecule by an sulfur atom (aryl-S) and includes, for example, thiophenoxy, thionaphthoxy and the like.

The term “aryl” means an aryl group as defined above attached to a molecule by an carbonyl group (aryl-C(O)-) and includes, for example, benzoyl, naphthoyl and the like.

5 The term “aryloxy” means an aryl group as defined above attached to a molecule by an oxygen atom (aryl-O) and includes, for example, benzoyloxy or benzoxy, naphthoyloxy and the like.

The term “HET” is defined as a 5- to 10-membered aromatic, partially aromatic or non-aromatic mono- or bicyclic ring, containing 1-4 heteroatoms selected from O, S and N, and optionally substituted with 1-2 oxo groups. Preferably, “HET”  
10 is a 5- or 6-membered aromatic or non-aromatic monocyclic ring containing 1-3 heteroatoms selected from O, S and N, for example, pyridine, pyrimidine, pyridazine, furan, thiophene, thiazole, oxazole, isooxazole and the like, or HET is a 9- or 10- membered aromatic or partially aromatic bicyclic ring containing 1-3 heteroatoms selected from O, S, and N, for example, benzofuran, benzothiophene, indole,  
15 pyranopyrrole, benzopyran, quinoline, benzocyclohexyl, naphthyridine and the like. “HET” also includes the following: benzimidazolyl, benzofuranyl, benzopyrazolyl, benzotriazolyl, benzothiophenyl, benzoazolyl, carbazolyl, carbolinyl, cinnolinyl, furanyl, imidazolyl, indolinyl, indolyl, indolazinyl, indazolyl, isobenzofuranyl, isoindolyl, isoquinolyl, isothiazolyl, isoxazolyl, naphthyridinyl, oxadiazolyl, oxazolyl,  
20 pyrazinyl, pyrazolyl, pyridopyridinyl, pyridazinyl, pyridyl, pyrimidyl, pyrrolyl, quinazolinyl, quinolyl, quinoxalinyl, thiadiazolyl, thiazolyl, thienyl, triazolyl, azetidinyl, 1,4-dioxanyl, hexahydroazepinyl, piperazinyl, piperidinyl, pyrrolidinyl, morpholinyl, thiomorpholinyl, dihydrobenzimidazolyl, dihydrobenzofuranyl, dihydrobenzothiophenyl, dihydrobenzoazolyl, dihydrofuranyl, dihydroimidazolyl,  
25 dihydroindolyl, dihydroisooxazolyl, dihydroisothiazolyl, dihydrooxadiazolyl, dihydrooxazolyl, dihydropyrazinyl, dihydropyrazolyl, dihydropyridinyl, dihydropyrimidinyl, dihydropyrrolyl, dihydroquinolinyl, dihydrotetrazolyl, dihydrothiadiazolyl, dihydrothiazolyl, dihydrothienyl, dihydrotriazolyl, dihydroazetidinyl, methylenedioxybenzoyl, tetrahydrofuranyl, and tetrahydrothienyl.

30 For all of the above definitions, each reference to a group is independent of all other references to the same group when referred to in the Specification. For example, if both R<sup>1</sup> and R<sup>2</sup> are HET, the definitions of HET are independent of each other and R<sup>1</sup> and R<sup>2</sup> may be different HET groups, for example furan and thiophene.

The term "treating" encompasses not only treating a patient to relieve the patient of the signs and symptoms of the disease or condition but also prophylactically treating an asymptomatic patient to prevent the onset of the disease or condition or preventing, slowing or reversing the progression of the disease or condition. The term "amount effective for treating" is intended to mean that amount of a drug or pharmaceutical agent that will elicit the biological or medical response of a tissue, a system, animal or human that is being sought by a researcher, veterinarian, medical doctor or other clinician. The term also encompasses the amount of a pharmaceutical drug that will prevent or reduce the risk of occurrence of the biological or medical event that is sought to be prevented in a tissue, a system, animal or human by a researcher, veterinarian, medical doctor or other clinician.

The following abbreviations have the indicated meanings:

	AIBN	=	2,2'-azobisisobutyronitrile
	B.P.	=	benzoyl peroxide
15	Bn	=	benzyl
	CCl <sub>4</sub>	=	carbon tetrachloride
	D	=	-O(CH <sub>2</sub> ) <sub>3</sub> O-
	DAST	=	diethylamine sulfur trifluoride
	DCC	=	dicyclohexyl carbodiimide
20	DCI	=	1-(3-dimethylaminopropyl)-3-ethyl carbodiimide
	DEAD	=	diethyl azodicarboxylate
	DIBAL	=	diisobutyl aluminum hydride
	DME	=	ethylene glycol dimethylether
25	DMAP	=	4-(dimethylamino)pyridine
	DMF	=	N,N-dimethylformamide
	DMSO	=	dimethyl sulfoxide
	Et <sub>3</sub> N	=	triethylamine
	LDA	=	lithium diisopropylamide
30	m-CPBA	=	metachloroperbenzoic acid
	NBS	=	N-bromosuccinimide
	NSAID	=	non-steroidal anti-inflammatory drug
	PCC	=	pyridinium chlorochromate
	PDC	=	pyridinium dichromate
35	Ph	=	phenyl

	1,2-Ph	=	1,2-benzenediyl
	Pyr	=	pyridinediyl
	Qn	=	7-chloroquinolin-2-yl
	Rs	=	-CH <sub>2</sub> SCH <sub>2</sub> CH <sub>2</sub> Ph
5	r.t.	=	room temperature
	rac.	=	racemic
	THF	=	tetrahydrofuran
	THP	=	tetrahydropyran-2-yl

10 Alkyl group abbreviations

	Me	=	methyl
	Et	=	ethyl
	n-Pr	=	normal propyl
	i-Pr	=	isopropyl
15	n-Bu	=	normal butyl
	i-Bu	=	isobutyl
	s-Bu	=	secondary butyl
	t-Bu	=	tertiary butyl
	c-Pr	=	cyclopropyl
20	c-Bu	=	cyclobutyl
	c-Pen	=	cyclopentyl
	c-Hex	=	cyclohexyl

25 Some of the compounds described herein contain one or more asymmetric centers and may thus give rise to diastereomers and optical isomers. The present invention is meant to comprehend such possible diastereomers as well as their racemic and resolved, enantiomerically pure forms and pharmaceutically acceptable salts thereof.

30 Some of the compounds described herein contain olefinic double bonds, and unless specified otherwise, are meant to include both E and Z geometric isomers.

35 The pharmaceutical compositions of the present invention comprise a compound of Formula I as an active ingredient or a pharmaceutically acceptable salt, thereof, and may also contain a pharmaceutically acceptable carrier and optionally other therapeutic ingredients. The term "pharmaceutically acceptable salts" refers to

salts prepared from pharmaceutically acceptable non-toxic bases including inorganic bases and organic bases. Salts derived from inorganic bases include aluminum, ammonium, calcium, copper, ferric, ferrous, lithium, magnesium, manganic salts, manganous, potassium, sodium, zinc, and the like. Particularly preferred are the

5 ammonium, calcium, magnesium, potassium, and sodium salts. Salts derived from pharmaceutically acceptable organic non-toxic bases include salts of primary, secondary, and tertiary amines, substituted amines including naturally occurring substituted amines, cyclic amines, and basic ion exchange resins, such as arginine, betaine, caffeine, choline, N,N'-dibenzylethylenediamine, diethylamine, 2-

10 diethylaminoethanol, 2-dimethylaminoethanol, ethanolamine, ethylenediamine, N-ethyl-morpholine, N-ethylpiperidine, glucamine, glucosamine, histidine, hydrabamine, isopropylamine, lysine, methylglucamine, morpholine, piperazine, piperidine, polyamine resins, procaine, purines, theobromine, triethylamine, trimethylamine, tripropylamine, tromethamine, and the like.

15 When the compound of the present invention is basic, salts may be prepared from pharmaceutically acceptable non-toxic acids, including inorganic and organic acids. Such acids include acetic, benzenesulfonic, benzoic, camphorsulfonic, citric, ethanesulfonic, fumaric, gluconic, glutamic, hydrobromic, hydrochloric, isethionic, lactic, maleic, malic, mandelic, methanesulfonic, mucic, nitric, pamoic,

20 pantothenic, phosphoric, succinic, sulfuric, tartaric, p-toluenesulfonic acid, and the like. Particularly preferred are citric, hydrobromic, hydrochloric, maleic, phosphoric, sulfuric, and tartaric acids.

25 It will be understood that in the discussion of methods of treatment which follows, references to the compounds of Formula I are meant to also include the pharmaceutically acceptable salts.

The magnitude of prophylactic or therapeutic dose of a compound of Formula I will, of course, vary with the nature and the severity of the condition to be treated and with the particular compound of Formula I and its route of administration. It will also vary according to a variety of factors including the age, weight, general

30 health, sex, diet, time of administration, rate of excretion, drug combination and response of the individual patient. In general, the daily dose from about 0.001 mg to about 100 mg per kg body weight of a mammal, preferably 0.01 mg to about 10 mg per kg. On the other hand, it may be necessary to use dosages outside these limits in some cases.

The amount of active ingredient that may be combined with the carrier materials to produce a single dosage form will vary depending upon the host treated and the particular mode of administration. For example, a formulation intended for oral administration to humans may contain from about 0.5 mg to about 5 g of active agent compounded with an appropriate and convenient amount of carrier material which may vary from about 5 to about 95 percent of the total composition. Dosage unit forms will generally contain from about 1 mg to about 2 g of an active ingredient, typically 25 mg, 50 mg, 100 mg, 200 mg, 300 mg, 400 mg, 500 mg, 600 mg, 800 mg, or 1000 mg.

10 For the treatment of glucocorticoid receptor mediated diseases the compound of Formula I may be administered orally, topically, parenterally, by inhalation spray or rectally in dosage unit formulations containing conventional non-toxic pharmaceutically acceptable carriers, adjuvants and vehicles. The term parenteral as used herein includes subcutaneous, intravenous, intramuscular, 15 intrasternal injection or infusion techniques. In addition to the treatment of warm-blooded animals such as mice, rats, horses, cattle, sheep, dogs, cats, etc., the compound of the invention is effective in the treatment of humans.

The pharmaceutical compositions containing the active ingredient may be in a form suitable for oral use, for example, as tablets, troches, lozenges, solutions, 20 aqueous or oily suspensions, dispersible powders or granules, emulsions, hard or soft capsules, syrups or elixirs. Compositions intended for oral use may be prepared according to any method known to the art for the manufacture of pharmaceutical compositions and such compositions may contain one or more agents selected from the group consisting of sweetening agents, flavouring agents, colouring agents and 25 preserving agents in order to provide pharmaceutically elegant and palatable preparations. Tablets contain the active ingredient in admixture with non-toxic pharmaceutically acceptable excipients which are suitable for the manufacture of tablets. These excipients may be for example, inert diluents, such as calcium carbonate, sodium carbonate, lactose, calcium phosphate or sodium phosphate; 30 granulating and disintegrating agents, for example, corn starch, or alginic acid; binding agents, for example starch, gelatin or acacia, and lubricating agents, for example, magnesium stearate, stearic acid or talc. The tablets may be uncoated or they may be coated by known techniques to delay disintegration and absorption in the gastrointestinal tract and thereby provide a sustained action over a longer period. For 35 example, a time delay material such as glyceryl monostearate or glyceryl distearate

may be employed. They may also be coated by the technique described in the U.S. Patent 4,256,108; 4,166,452; and 4,265,874 to form osmotic therapeutic tablets for control release.

Formulations for oral use may also be presented as hard gelatin 5 capsules wherein the active ingredient is mixed with an inert solid diluent, for example, calcium carbonate, calcium phosphate or kaolin, or as soft gelatin capsules wherein the active ingredients is mixed with water-miscible solvents such as propylene glycol, PEGs and ethanol, or an oil medium, for example peanut oil, liquid paraffin, or olive oil.

10 Aqueous suspensions contain the active material in admixture with excipients suitable for the manufacture of aqueous suspensions. Such excipients are suspending agents, for example sodium carboxymethylcellulose, methylcellulose, hydroxypropyl methylcellulose, sodium alginate, polyvinylpyrrolidone, gum tragacanth and gum acacia; dispersing or wetting agents may be a naturally-occurring 15 phosphatide, for example lecithin, or condensation products of an alkylene oxide with fatty acids, for example polyoxyethylene stearate, or condensation products of ethylene oxide with long chain aliphatic alcohols, for example heptadecaethyleneoxycetanol, or condensation products of ethylene oxide with partial esters derived from fatty acids and a hexitol such as polyoxyethylene sorbitol 20 monooleate, or condensation products of ethylene oxide with partial esters derived from fatty acids and hexitol anhydrides, for example polyethylene sorbitan monooleate. The aqueous suspensions may also contain one or more preservatives, for example ethyl, or n-propyl, p-hydroxybenzoate, one or more colouring agents, one or more flavouring agents, and one or more sweetening agents, such as sucrose, 25 saccharin or aspartame.

Oily suspensions may be formulated by suspending the active 30 ingredient in a vegetable oil, for example arachis oil, olive oil, sesame oil or coconut oil, or in mineral oil such as liquid paraffin. The oily suspensions may contain a thickening agent, for example beeswax, hard paraffin or cetyl alcohol. Sweetening agents such as those set forth above, and flavouring agents may be added to provide a palatable oral preparation. These compositions may be preserved by the addition of an anti-oxidant such as ascorbic acid.

35 Dispersible powders and granules suitable for preparation of an aqueous suspension by the addition of water provide the active ingredient in admixture with a dispersing or wetting agent, suspending agent and one or more

preservatives. Suitable dispersing or wetting agents and suspending agents are exemplified by those already mentioned above. Additional excipients, for example sweetening, flavouring and colouring agents, may also be present.

The pharmaceutical compositions of the invention may also be in the 5 form of an oil-in-water emulsion. The oily phase may be a vegetable oil, for example olive oil or arachis oil, or a mineral oil, for example liquid paraffin or mixtures of these. Suitable emulsifying agents may be naturally-occurring phosphatides, for example soy bean, lecithin, and esters or partial esters derived from fatty acids and hexitol anhydrides, for example sorbitan monooleate, and condensation products of 10 the said partial esters with ethylene oxide, for example polyoxyethylene sorbitan monooleate. The emulsions may also contain sweetening and flavouring agents.

Syrups and elixirs may be formulated with sweetening agents, for example glycerol, propylene glycol, sorbitol or sucrose. Such formulations may also contain a demulcent, a preservative and flavouring and colouring agents. The 15 pharmaceutical compositions may be in the form of a sterile injectable aqueous or oleagenous suspension. This suspension may be formulated according to the known art using those suitable dispersing or wetting agents and suspending agents which have been mentioned above. The sterile injectable preparation may also be a sterile injectable solution or suspension in a non-toxic parenterally-acceptable diluent or 20 solvent, for example as a solution in 1,3-butane diol. Among the acceptable vehicles and solvents that may be employed are water, Ringer's solution and isotonic sodium chloride solution. Cosolvents such as ethanol, propylene glycol or polyethylene glycols may also be used. In addition, sterile, fixed oils are conventionally employed as a solvent or suspending medium. For this purpose any bland fixed oil may be 25 employed including synthetic mono- or diglycerides. In addition, fatty acids such as oleic acid find use in the preparation of injectables.

The compounds of Formula I may also be administered in the form of 30 suppositories for rectal administration of the drug. These compositions can be prepared by mixing the drug with a suitable non-irritating excipient which is solid at ambient temperatures but liquid at the rectal temperature and will therefore melt in the rectum to release the drug. Such materials are cocoa butter and polyethylene glycols.

For topical use, creams, ointments, gels, solutions or suspensions, etc., containing a compound of Formula I are employed. (For purposes of this application, topical application shall include mouth washes and gargles.) Topical formulations

may generally be comprised of a pharmaceutical carrier, cosolvent, emulsifier, penetration enhancer, preservative system, and emollient.

The ability of the compounds of Formula I to selectively modulate glucocorticoid receptors makes them useful for treating, preventing or reversing the progression of a variety of inflammatory and autoimmune diseases and conditions. Thus, the compounds of the present invention are useful to treat, prevent or ameliorate the following diseases or conditions: inflammation, tissue rejection, auto-immunity, various malianancies, such as leukemias and lymphomas, Cushing's syndrome, acute adrenal insufficiency, congenital adrenal hyperplasia, rheumatic fever, polyarteritis nodosa, granulomatous polyarteritis, inhibition of myeloid cell lines, immune proliferation/apoptosis, HPA axis suppression and regulation, hypercortisolemia, stroke and spinal cord injury, hypercalcemia, hyperglycemia, acute adrenal insufficiency, chronic primary adrenal insufficiency, secondary adrenal insufficiency, congenital adrenal hyperplasia, cerebral edema, thrombocytopenia, Little's syndrome, obesity and metabolic syndrome.

The compounds of the present invention are also useful for treating, preventing or reversing the progression of disease states involving systemic inflammation such as inflammatory bowel disease, systemic lupus erythematosus, polyartitis nodosa, Wegener's granulomatosis, giant cell arteritis, rheumatoid arthritis, juvenile rheumatoid arthritis, uveitis, hay fever, allergic rhinitis, urticaria, angioneurotic edema, chronic obstructive pulmonary disease, asthma, tendonitis, bursitis, Crohn's disease, ulcerative colitis, autoimmune chronic active hepatitis, organ transplantation, hepatitis, and cirrhosis.

The compounds of the present invention are useful for treating, preventing or reversing the progression of a variety of topical diseases such as inflammatory scalp alopecia, panniculitis, psoriasis, discoid lupus erythematosus, inflamed cysts, atopic dermatitis, pyoderma gangrenosum, pemphigus vulgaris, buflous pemphigoid, systemic lupus erythematosus, dermatomyositis, herpes gestationis, eosinophilic fasciitis, relapsing polychondritis, inflammatory vasculitis, sarcoidosis, Sweet's disease, type I reactive leprosy, capillary hemangiomas, contact dermatitis, atopic dermatitis, lichen planus, exfoliative dermatitus, erythema nodosum, acne, hirsutism, toxic epidermal necrolysis, erythema multiform, cutaneous T-cell lymphoma.

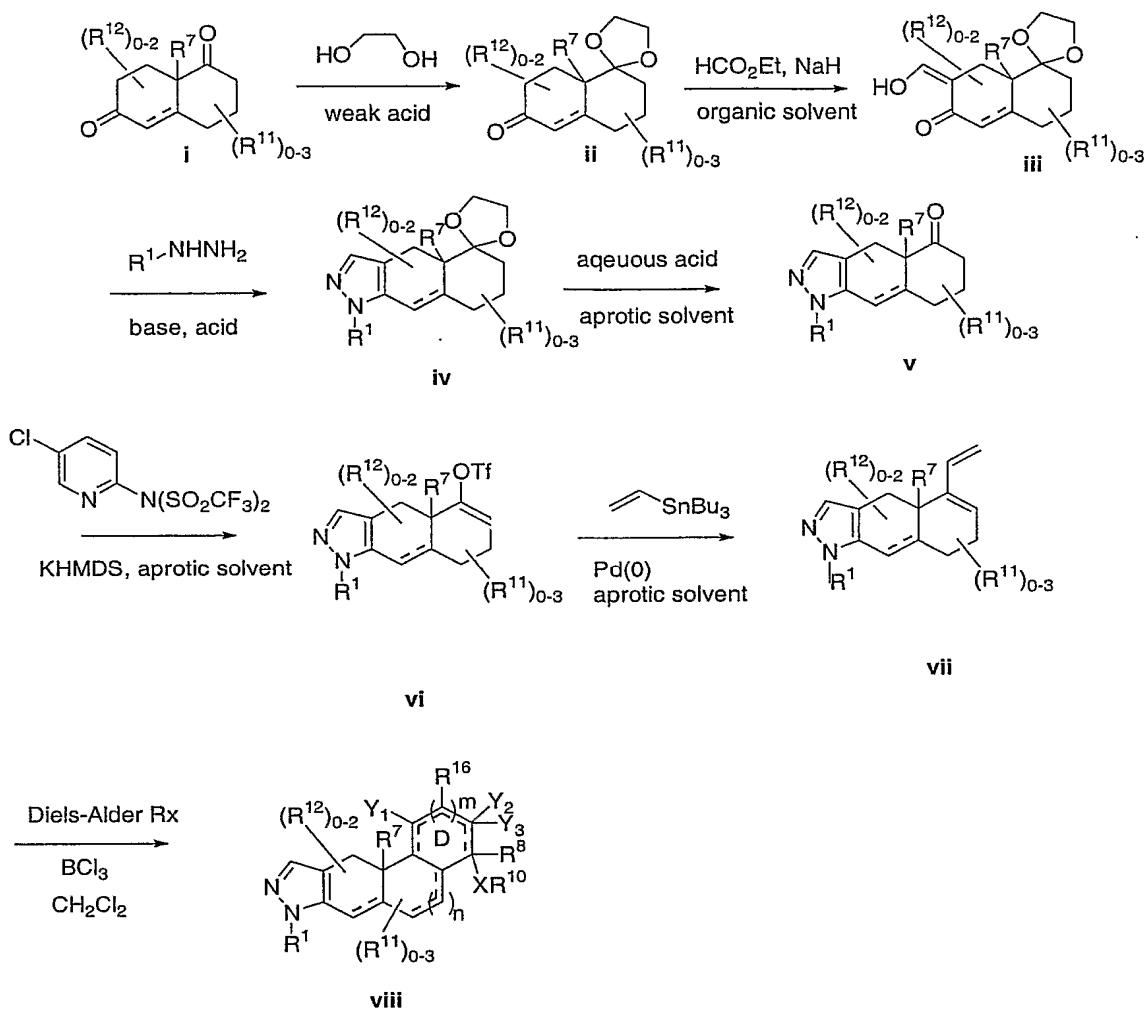
The compounds of the present invention are also useful in treating, preventing or reversing the progression of disease states associated with Human

Immunodeficiency Virus (HIV), cell apoptosis, and cancer including, but not limited to, Kaposi's sarcoma, immune system activation and modulation, desensitization of inflammatory responses, IL-1 expression, natural killer cell development, lymphocytic leukemia, and treatment of retinitis pigmentosa. Cognitive and behavioral processes are also susceptible to glucocorticoid therapy where antagonists would potentially be useful in the treatment of processes such as cognitive performance, memory and learning enhancement, depression, addiction, mood disorders, chronic fatigue syndrome, schizophrenia, stroke, sleep disorders, and anxiety.

The invention also encompasses a method for treating a glucocorticoid receptor mediated disease comprising concomitantly administering to a patient in need of such treatment a compound of Formula I and one or additional more agents. For treating or preventing asthma or chronic obstructive pulmonary disease, the compounds of Formula I may be combined with one or more agents selected from the group consisting of:  $\beta$ -agonists (e.g., salmeterol), theophylline, anticholinergics (e.g., atropine and ipratropium bromide), cromolyn, nedocromil and leukotriene modifiers (e.g., montelukast). For treating or preventing inflammation, the compounds of Formula I may be combined with one or the following: a salicylate, including acetylsalicylic acid, a non-steroidal antiinflammatory drug, including indomethacin, sulindac, mefenamic, meclofenamic, tolfenamic, tolmetin, ketorolac, dicofenac, ibuprofen, naproxen, fenoprofen, ketoprofen, flurbiprofen and oxaprozin, a TNF inhibitor, including etanercept and infliximab, an IL-1 receptor antagonist, a cytotoxic or immunosuppressive drug, including methotrexate, leflunomide, azathioprine and cyclosporine, a gold compound, hydroxychloroquine or sulfasalazine, penicillamine, darbufelone, and a p38 kinase inhibitor. The compound of Formula I may also be used in combination with bisphosphonates such as alendronate to treat a glucocorticoid mediated disease and simultaneously inhibit osteoclast-mediated bone resorption.

#### METHODS OF SYNTHESIS

Generally, compounds of the present invention may be synthesized by following the following synthetic scheme:



5 Acid, such as p-toluenesulfonic acid, is added to a solution of the  
 10 Wieland-Miescher ketone **i** in ethylene glycol to give ketal **ii**. Ethyl formate and  
 sodium hydride are added to ketal **ii** in an organic solvent such as anhydrous  
 benzene to afford hydroxyketone **iii**. The hydroxyketone **iii** is dissolved in an  
 appropriate acid such as glacial acetic acid and the appropriate hydrazine such as  
*p*-fluorophenylhydrazine hydrochloride and appropriate base such as sodium acetate  
 is added to give pyrazole ketal **iv**. The pyrazole ketal **iv** is dissolved in an aprotic  
 solvent such as THF and an aqueous acid such as aqueous 6N HCl is added to  
 yield the ketone **v**.

2-[N,N-Bis(trifluomethylsulphonyl)-amino]-5-chloropyridine is added  
 to Potassium bis(trimethylsilyl amide) in an aprotic solvent such as THF to give the

triflate **vi**. Diene **vii** is obtained by reaction of **vi** with vinyl tributyl tin and a palladium (0) source such as tetrakis(triphenylphosphine) palladium (0) in an aprotic solvent such as THF. Diels-Alder reaction in the presence of a Lewis acid in a non-polar solvent such as methylene chloride at low temperature yields the final product 5 **viii**.

Methods for making compounds of Formula I outside the scope of formula **viii** are easily discernible by those having ordinary skill in the art in view of the above method and the examples set forth below. See, for example, Org. React. 4, 1, 1948; Org. React. 4, 60, 1958; Chem. Rev. 61, 537, 1961; Diels-Alder Reaction, 10 Elsevier, London, 1965; 1-4 Cycloadditions Reactions- The Diels-Alder Reaction in Heterocyclic Syntheses, Academic Press, New York, 1967; Angew Chem. Int. Ed. Engl. 19, 779, 1980; J. Am. Chem. Soc. 95, 4094, 1973.

15 The invention will now be illustrated by the following non-limiting examples in which, unless stated otherwise:

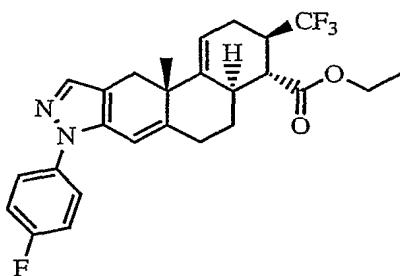
- (i) all operations were carried out at room or ambient temperature, that is, at a temperature in the range 18-25°C.,
- (ii) evaporation of solvent was carried out using a rotary evaporator under reduced pressure (600-4000 pascals: 4.5-30 mm. Hg) with a bath temperature 20 of up to 60°C.,
- (iii) the course of reactions was followed by thin layer chromatography (TLC) and reaction times are given for illustration only;
- (iv) melting points are uncorrected and 'd' indicates decomposition; the melting points given are those obtained for the materials prepared as described;
- 25 polymorphism may result in isolation of materials with different melting points in some preparations;
- (v) the structure and purity of all final products were assured by at least one of the following techniques: TLC, mass spectrometry, nuclear magnetic resonance (NMR) spectrometry or microanalytical data;
- 30 (vi) yields are given for illustration only;
- (vii) when given, NMR data is in the form of delta ( $\delta$ ) values for major diagnostic protons, given in parts per million (ppm) relative to tetramethylsilane (TMS) as internal standard, determined at 500 MHz or 600 MHz using the indicated solvent; conventional abbreviations used for signal shape are: s.

singlet; d. doublet; t. triplet; m. multiplet; br. broad; etc.: in addition "Ar" signifies an aromatic signal;

(viii) chemical symbols have their usual meanings; the following abbreviations have also been used v (volume), w (weight), b.p. (boiling point), m.p. 5 (melting point), L (litre(s)), mL (millilitres), g (gram(s)), mg (milligrams(s)), mol (moles), mmol (millimoles), eq (equivalent(s)).

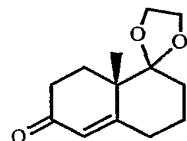
#### EXAMPLE 1

10



Ethyl (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylate

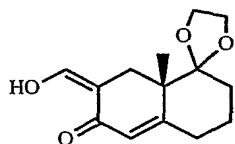
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Step A: (8aR)-8a-hydroxy-3,4,8,8a-tetrahydronaphthalene-1,6(2H,7H)-dione-1-ethylene ketal

(S) Wieland-Miescher ketone (5 g, 28.05 mmol) was dissolved in ethylene glycol (140 mL) and stirred at room temperature. Next, 4 Å molecular sieves (~5 g) followed by *p*-toluenesulfonic acid (5.34g, 28.05 mmol) were added. After stirring at room temperature for 23 minutes, the reaction was poured slowly 25. into a 2:1 mixture of ice water/sat. NaHCO<sub>3</sub> (150 mL). The reaction was extracted with EtOAc (4 x 100 mL) and the combined organic layers were washed with brine (100 mL), dried over MgSO<sub>4</sub>, filtered and concentrated *in vacuo*. The

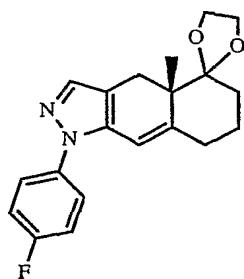
residue was purified by flash chromatography (0 to 40% EtOAc/hexanes) on silica gel to afford 5.77g (93%) of (8a*R*)-8a-hydroxy-3,4,8,8a-tetrahydronaphthalene-1,6(2*H*,7*H*)-dione-1-ethylene ketal as a white solid. LCMS = 223; (M + 1)<sup>+</sup>. <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz):  $\delta$  5.83 (br d, *J* = 1.8 Hz, 1H), 4.43-3.94 (m, 4H), 2.49-5 2.40 (m, 3H), 2.39-2.27 (m, 2H), 1.95-1.88 (m, 1H), 1.84-1.78 (m, 1H), 1.76-1.64 (m, 3H), 1.37 (s, 3H).



10

Step B: (7*E*,8a*S*)-7-(hydroxymethylene)-8a-methyl-3,4,8,8a-tetrahydronaphthalene-1,6(2*H*,7*H*)-dione-1-ethylene ketal

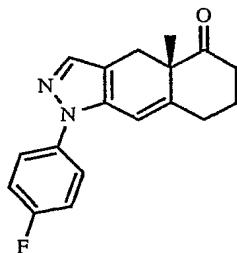
(8a*R*)-8a-hydroxy-3,4,8,8a-tetrahydronaphthalene-1,6(2*H*,7*H*)-dione-1-ethylene ketal (4.8 g, 21.62 mmol) was dissolved in 200 mL benzene and 15 ~50 mL benzene were distilled off atmospherically. The solution was cooled to ~40 °C and ethyl formate (7.36 mL, 86.48 mmol) was added, followed by sodium hydride (60% suspension in mineral oil; 3.46 g, 86.48 mmol). Next, 450 mL MeOH was added (bubbling evident) and the reaction was allowed to warm to room temperature. After stirring for 3 hours, the reaction was cooled to 0 °C and 20 50 mL H<sub>2</sub>O was added slowly. The biphasic system was shaken and the organic layer was washed with H<sub>2</sub>O (3 x 50 mL). The combined aqueous layers were washed with diethyl ether (100 mL) and then acidified to pH 5.5-6 with sat. KH<sub>2</sub>PO<sub>4</sub>. The aqueous layer was extracted with EtOAc (5 x 200 mL). The combined extracts were dried over Na<sub>2</sub>SO<sub>4</sub> and concentrated *in vacuo* to afford 25 5.04 g (93%) of (7*E*,8a*S*)-7-(hydroxymethylene)-8a-methyl-3,4,8,8a-tetrahydronaphthalene-1,6(2*H*,7*H*)-dione-1-ethylene ketal as an orange oil. LCMS = 251; (M + 1)<sup>+</sup>. This material was used without further purification.



Step C: (4a*S*)-1-(4-fluorophenyl)-4*a*-methyl-1,4,4*a*,6,7,8-hexahydro-5*H*-benzo[*f*]indazol-5-one-5-ethylene ketal

5 (7E,8aS)-7-(hydroxymethylene)-8a-methyl-3,4,8,8a-  
 tetrahydronaphthalene-1,6(2H,7H)-dione-1-ethylene ketal (4.1 g, 16.4 mmol) was  
 dissolved in glacial acetic acid (40mL) and *p*-fluorophenylhydrazine  
 hydrochloride (2.8 g, 17.22 mmol) and sodium acetate (1.41 g, 17.22 mmol) were  
 added. After stirring at room temperature for 2 hours, the reaction was poured  
 10 slowly into 10% NaHCO<sub>3</sub> (1 L) and extracted with EtOAc (6 x 500 mL). The  
 combined extracts were washed with brine (500 mL), dried over MgSO<sub>4</sub> and  
 concentrated *in vacuo*. The crude material was purified by flash chromatography  
 (10% EtOAc/hexanes) on silica gel to afford 2.26 g (41%) of (4aS)-1-(4-  
 fluorophenyl)-4a-methyl-1,4,4a,6,7,8-hexahydro-5*H*-benzo[*f*]indazol-5-one-5-  
 ethylene ketal as an orange solid. LCMS = 341; (M + 1)<sup>+</sup>. <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500  
 15 MHz):  $\delta$  7.47-7.44 (m, 2H), 7.43 (s, 1H), 7.18-7.16 (d, *J* = 8.5 Hz, 1H), 7.16-7.14  
 (d, *J* = 8.7 Hz, 1H), 6.22 (br d, *J* = 2.2 Hz, 1H), 4.11-4.01 (m, 4H), 3.20-3.16 (d, *J*  
 = 15.7 Hz, 1H), 2.54-2.51 (d, *J* = 16 Hz, 1H), 2.51-2.40 (m, 1H), 2.34-2.28 (m,  
 1H), 1.88-1.64 (m, 4H), 1.23 (s, 3H).

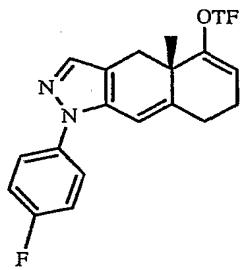
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Step D: (4a*S*)-1-(4-fluorophenyl)-4*a*-methyl-1,4,4*a*,6,7,8-hexahydro-5*H*-benzo[*f*]indazol-5-one

The (4a*S*)-1-(4-fluorophenyl)-4a-methyl-1,4,4a,6,7,8-hexahydro-5*H*-benzo[*f*]indazol-5-one-5-ethylene ketal (2.26 g; 6.65 mmol) was dissolved in THF (65 mL) and 6N HCl (4.43 mL, 26.6 mL) was added. The reaction was heated to 65 °C for 3.5 hours and then poured slowly into 10% NaHCO<sub>3</sub> (150 mL). The mixture was extracted with EtOAc (4 x 250 mL) and the combined extracts washed with brine (2 x 200 mL), dried over MgSO<sub>4</sub> and concentrated *in vacuo* to afford 1.97 g (100%) of (4a*S*)-1-(4-fluorophenyl)-4a-methyl-1,4,4a,6,7,8-hexahydro-5*H*-benzo[*f*]indazol-5-one as a brown oil. LCMS = 297; (M + 1)<sup>+</sup>. <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz): δ 7.50 (s, 1H), 7.49-7.45 (m, 2H), 7.20-7.16 (m, 2H), 6.31 (br d, *J* = 2 Hz, 1H), 2.96-2.88 (m, 2H), 2.72-2.62 (m, 2H), 2.59-2.53 (m, 2H), 2.14-2.80 (m, 1H), 1.75-1.64 (qt, *J* = 13.1 Hz, 1H), 1.27 (s, 3H).

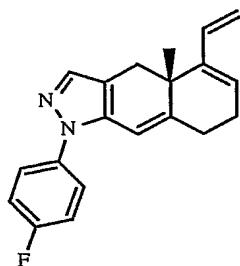
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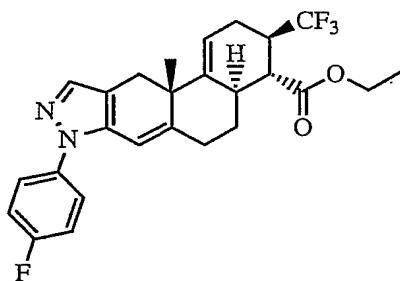
Step E: (4a*S*)-1-(4-fluorophenyl)-4a-methyl-4,4a,7,8-tetrahydro-1*H*-benzo[*f*]indazol-5-yl trifluoromethanesulfonate

(4a*S*)-1-(4-fluorophenyl)-4a-methyl-1,4,4a,6,7,8-hexahydro-5*H*-benzo[*f*]indazol-5-one (0.44 g, 1.49 mmol) was dissolved in THF (30 mL) and cooled to 0 °C. Potassium hexamethyldisilazide (40.51 mL of a 0.5 M solution in toluene, 20.28 mmol) was added. The reaction was allowed to warm to room temperature and stirred for 1.5 hours prior to addition of 2-[*N,N*-bis(trifluoromethylsulfonyl)amino]-5-chloropyridine (7.96 g, 20.28 mmol). The reaction was stirred at room temperature for 18 hours and then quenched with sat. NH<sub>4</sub>Cl (50 mL) and H<sub>2</sub>O (50 mL). The resultant mixture was extracted with EtOAc (4 x 200 mL) and the combined extracts were washed with H<sub>2</sub>O (200 mL) and brine (200 mL), dried over MgSO<sub>4</sub> and concentrated *in vacuo*. The residue was filtered through a plug of silica and then purified by flash chromatography (5 to 15% EtOAc/hexanes) on silica gel to afford 1 g (46%) of (4a*S*)-1-(4-

fluorophenyl)-4a-methyl-4,4a,7,8-tetrahydro-1*H*-benzo[*f*]indazol-5-yl trifluoromethanesulfonate as a yellow solid. LCMS = 429; (M + 1)<sup>+</sup>. <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz):  $\delta$  7.51 (s, 1H), 7.50-7.46 (m, 2H), 7.21-7.19 (m, 2H), 6.33 (br d, *J* = 1.6 Hz, 1H), 5.93-5.91 (dd, *J* = 6.3 Hz, *J* = 1.9 Hz, 1H), 2.97-2.93 (d, *J* = 15.3 Hz, 1H), 2.77-2.73 (d, *J* = 15.3 Hz, 1H), 2.54-2.38 (m, 3H), 2.34-2.25 (m, 1H), 1.26 (s, 3H).



10 Step F: (4aS)-1-(4-fluorophenyl)-4a-methyl-5-vinyl-4,4a,7,8-tetrahydro-1*H*-benzo[*f*]indazole  
 (4aS)-1-(4-fluorophenyl)-4a-methyl-4,4a,7,8-tetrahydro-1*H*-benzo[*f*]indazol-5-yl trifluoromethanesulfonate (1 g, 2.34 mmol) was dissolved in THF (25 mL) and LiCl (298 mg, 7.02 mmol) and tetrakis(triphenylphosphine) palladium (0) (54 mg, 0.047 mmol) were added followed by tributyl(vinyl)tin (716  $\mu$ L, 2.45 mmol). The reaction was refluxed under N<sub>2</sub> for 18 hours and then concentrated *in vacuo*. The residue was partitioned between EtOAc (50 mL) and 10% NH<sub>4</sub>OH (50 mL). The aqueous layer was extracted with EtOAc (50 mL) and the combined organic layers were washed with H<sub>2</sub>O (50 mL) and brine (50 mL), dried over MgSO<sub>4</sub> and concentrated *in vacuo*. The product was purified by flash chromatography (5% EtOAc/hexanes) to afford 650 mg (91%) of (4a*S*)-1-(4-fluorophenyl)-4a-methyl-5-vinyl-4,4a,7,8-tetrahydro-1*H*-benzo[*f*]indazole as an off-white solid. LCMS = 307; (M + 1)<sup>+</sup>. <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz):  $\delta$  7.51-7.47 (m, 2H), 7.45 (s, 1H), 7.18-7.17 (d, *J* = 8.4 Hz, 1H), 7.17-7.16 (d, *J* = 8.6 Hz, 1H), 6.40-6.38 (d, *J* = 17.1 Hz, *J* = 10.8 Hz, 1H), 6.24 (br d, *J* = 2 Hz, 1H), 5.99-5.97 (d, *J* = 5.3 Hz, 1H), 5.44-5.40 (dd, *J* = 17.1 Hz, *J* = 1.6 Hz, 1H), 5.08-5.06 (dd, *J* = 10.9 Hz, *J* = 1.8 Hz, 1H), 2.92-2.89 (d, *J* = 15.5 Hz, 1H), 2.54-2.51 (d, *J* = 15.5 Hz, 1H), 2.48-2.42 (m, 1H), 2.39-2.29 (m, 2H), 2.20-2.13 (m, 1H), 1.16 (s, 3H).

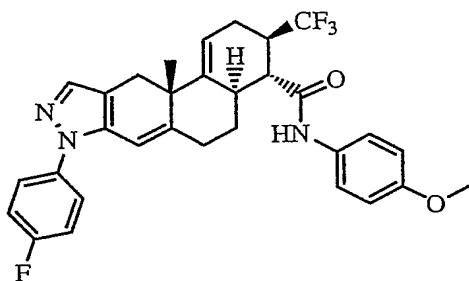


Step G: ethyl (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylate

5 (4aS)-1-(4-fluorophenyl)-4a-methyl-5-vinyl-4,4a,7,8-tetrahydro-1H-benzo[f]indazole (710 mg, 2.32 mmol) was dissolved in CH<sub>2</sub>Cl<sub>2</sub> (30 mL). Ethyl-4,4,4-trifluorocrotonate (381 µL; 2.55 mmol) was added, followed by dropwise addition of BCl<sub>3</sub> (5.8 mL of a 1.0 M solution in CH<sub>2</sub>Cl<sub>2</sub>, 5.8 mmol). The 10 reaction was stirred at room temperature for 3 hours and then quenched with sat. NH<sub>4</sub>Cl. The reaction was partitioned between CH<sub>2</sub>Cl<sub>2</sub> (50 mL) and H<sub>2</sub>O (50 mL) and the aqueous layer was extracted with CH<sub>2</sub>Cl<sub>2</sub> (2 x 50 mL). The combined organic layers were washed with 1N HCl (50 mL) and brine (50 mL), dried over MgSO<sub>4</sub> and concentrated *in vacuo*. The residue was purified by flash 15 chromatography (0 to 65% EtOAc/hexanes) on silica gel to afford 920 mg (84%) of the product as a mixture of 2 diastereomers. Separation by chiral HPLC (ChiralPak AD column; 15% isopropanol/heptane) gave 562 mg (61%) of ethyl (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylate as a 20 colorless solid. LCMS = 475; (M + 1)<sup>+</sup>. <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz): δ 7.49-7.45 (m, 2H), 7.43 (s, 1H), 7.19-7.17 (d, J = 8.5 Hz, 1H), 7.17-7.15 (d, J = 8.4 Hz, 1H), 6.21 (br s, 1H), 5.75 (br d, J = 5.9 Hz, 1H), 4.22-4.18 (q, J = 7.1 Hz, 2H), 2.90-2.86 (d, J = 15.8 Hz, 1H), 2.81-2.74 (m, 1H), 2.69-2.60 (m, 1H), 2.53-2.47 (m, 2H), 2.44-2.22 (m, 4H), 1.97-1.89 (m, 1H), 1.62-1.54 (m, 1H), 1.30-1.27 (t, J = 7.1 Hz, 3H), 1.24 (s, 3H).

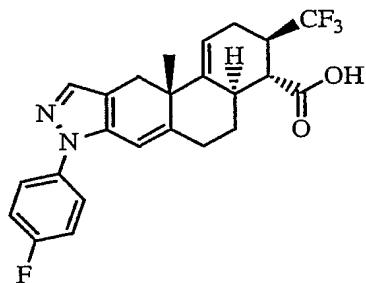
25

## EXAMPLE 2



5

(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-N-(4-methoxyphenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxamide



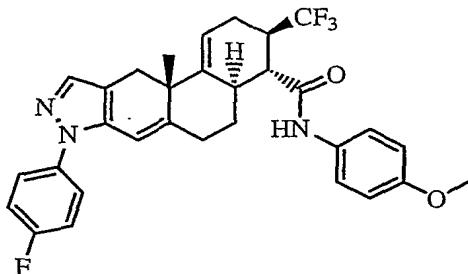
10

Step A: (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylic acid

15      Ethyl (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylate (106 mg, 0.224 mmol) was dissolved in 1:1:1 THF:MeOH:H<sub>2</sub>O (15 mL) and LiOH · H<sub>2</sub>O (94 mg, 2.24 mmol) was added. The reaction was stirred at room temperature for 60 hours and then concentrated *in vacuo*. The residue was dissolved in 1N NaOH (15 mL) and washed with diethyl ether (15 mL). The aqueous layer was acidified to pH = 3 with 1N HCl and extracted with EtOAc (4 x 25 mL). The combined extracts were dried over Na<sub>2</sub>SO<sub>4</sub> and concentrated *in vacuo* to afford 99 mg (99%) of (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylic acid as an off-white solid. LCMS = 447; (M + 1)<sup>+</sup>. <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz):  $\delta$  7.49-7.46 (m, 2H), 7.44 (s, 1H), 7.20-7.16 (m, 2H), 6.23 (br s, 1H),

5.79-5.77 (br d,  $J = 5.7$  Hz, 1H), 2.90-2.85 (d,  $J = 15.8$  Hz, 1H), 2.83-2.76 (m, 1H), 2.74-2.66 (m, 1H), 2.58-2.53 (dd,  $J = 11.1$  Hz,  $J = 9.1$  Hz, 1H) 2.54-2.51 (d,  $J = 15.7$  Hz, 1H), 2.48-2.24 (m, 4H), 2.07-1.99 (m, 1H), 1.67-1.59 (m, 1H), 1.25 (s, 3H).

5

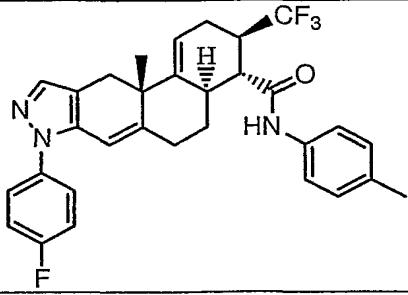
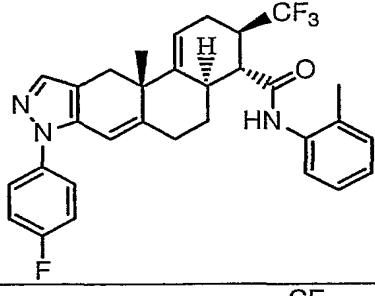
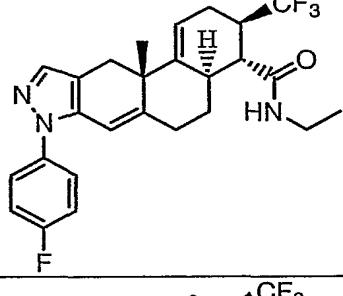
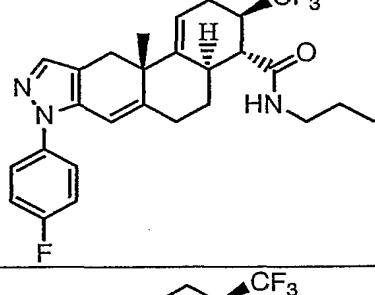
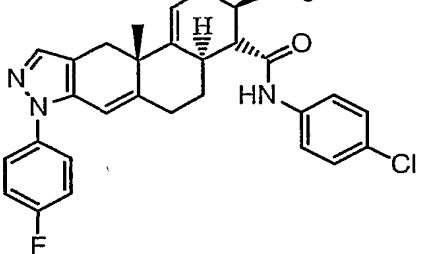


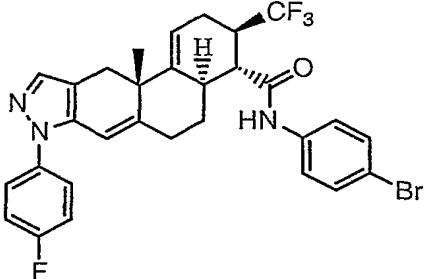
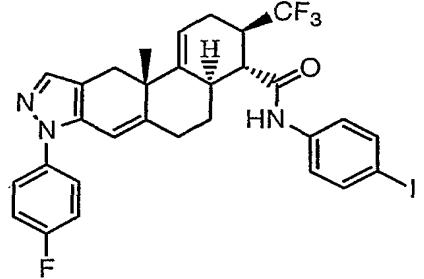
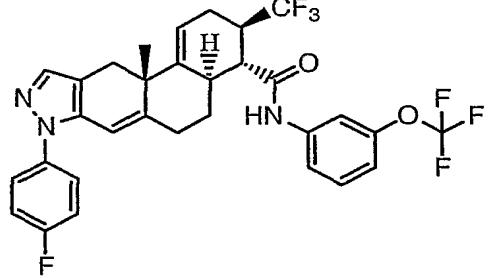
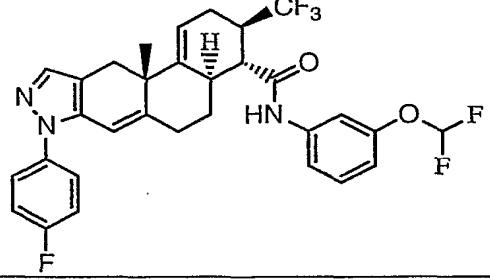
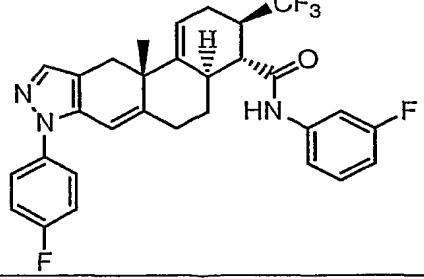
Step B: (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-N-(4-methoxyphenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxamide

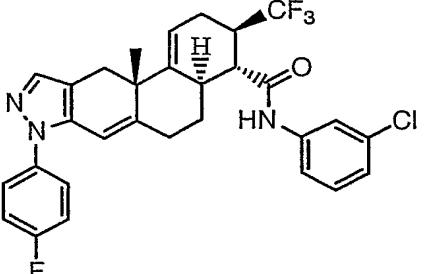
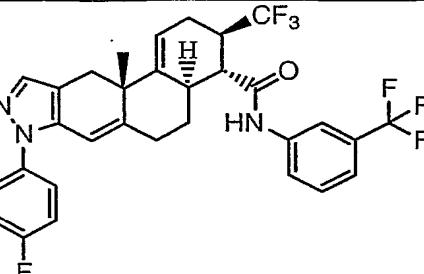
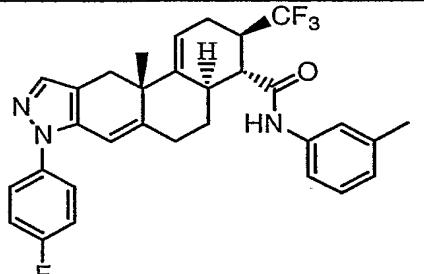
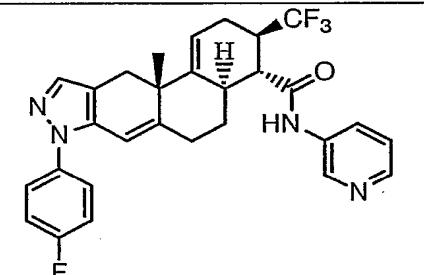
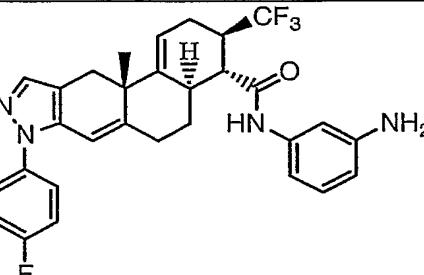
(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylic acid (7 mg, 0.0157 mmol) was dissolved in  $\text{CH}_2\text{Cl}_2$  (2 mL) and O-(7-azabenzotriazol-1-yl)-N,N,N',N'-tetramethyluronium hexafluorophosphate (12 mg, 0.0314 mmol), *N,N*-diisopropylethylamine (42.6 mL, 0.2355 mmol) and *p*-anisidine (19.3 mg, 0.157 mmol) were added. The reaction was stirred at room temperature for 18 hours. The reaction was diluted with  $\text{H}_2\text{O}$  (5 mL) and shaken. The  $\text{H}_2\text{O}$  was decanted off; the organic layer was dried over  $\text{MgSO}_4$  and concentrated *in vacuo*. The residue was purified by flash chromatography (0 to 20 25% EtOAc/hexanes) on silica gel to afford 7.7 mg (89%) of (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-N-(4-methoxyphenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxamide as an off-white solid. LCMS = 552 ( $M + 1$ )<sup>+</sup>. <sup>1</sup>H NMR ( $\text{CDCl}_3$ , 500 MHz):  $\delta$  7.49-7.45 (m, 2H), 7.43 (s, 1H), 7.42-7.40 (m, 2H), 7.19-7.15 (m, 3H), 6.90-6.87 (m, 2H), 6.20 (br s, 1H), 5.78-5.76 (br d,  $J = 6.2$  Hz, 1H), 3.81 (s, 3H), 2.99-2.93 (m, 1H), 2.93-2.89 (d,  $J = 15.7$  Hz, 1H), 2.81-2.72 (m, 1H), 2.57-2.53 (d,  $J = 15.8$  Hz, 1H), 2.30-2.25 (m, 4H), 2.25-2.20 (dd,  $J = 11.2$  Hz,  $J = 9.4$  Hz, 1H), 2.13-2.05 (m, 1H), 1.25 (s, 3H).

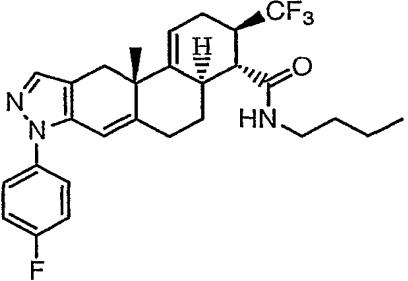
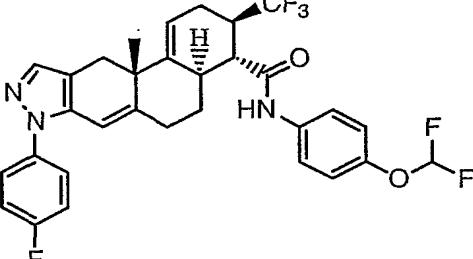
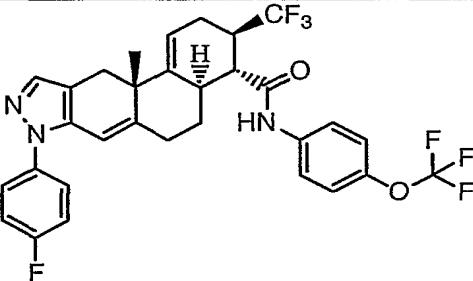
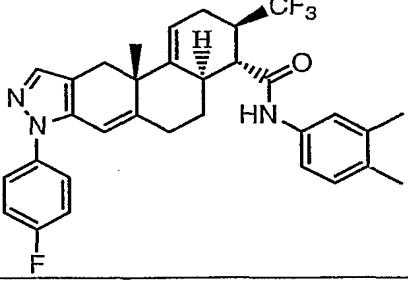
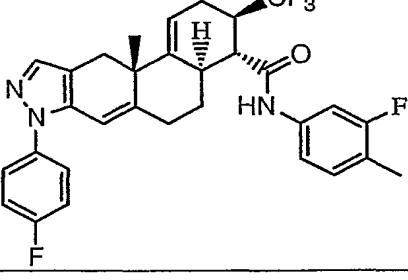
The following compounds were synthesized by procedures analogous to that described in EXAMPLE 2:

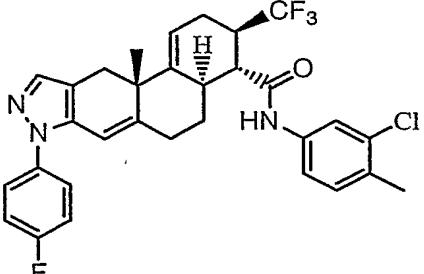
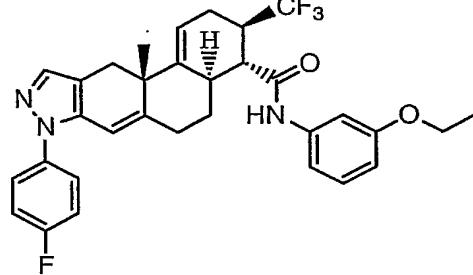
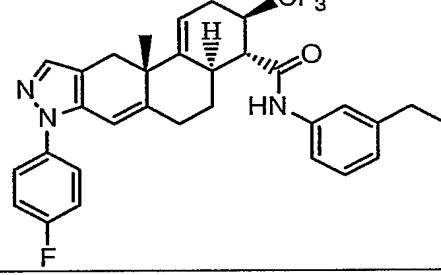
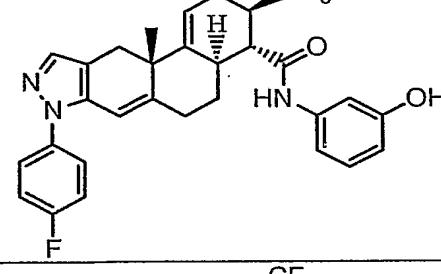
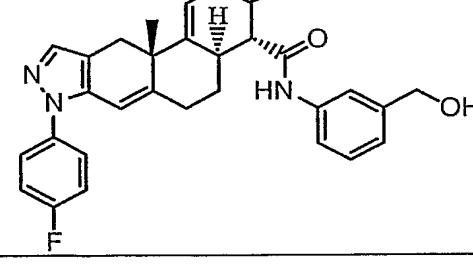
Compound	Molecular structure	LCMS (M+1) <sup>+</sup>
3		522
4		552
5		552
6		540

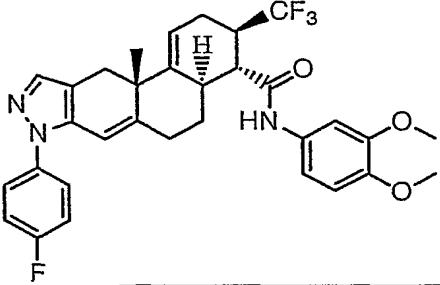
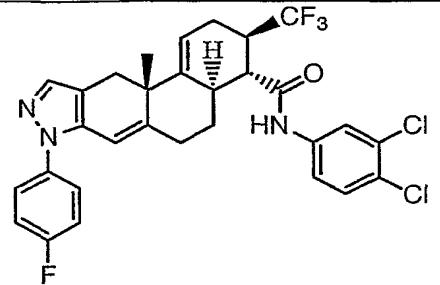
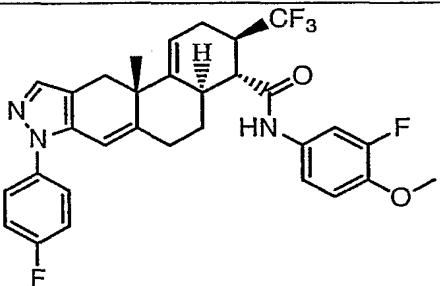
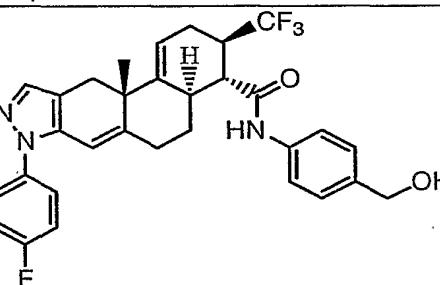
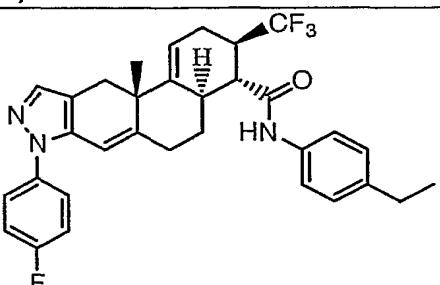
7		536
8		536
9		474
10		488
11		557

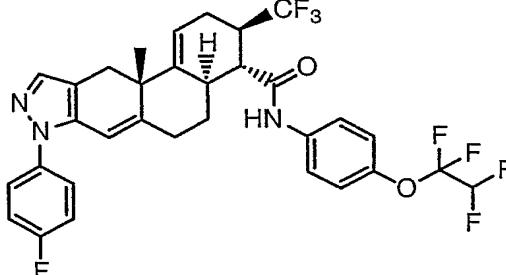
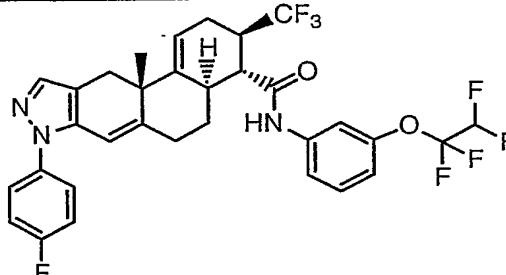
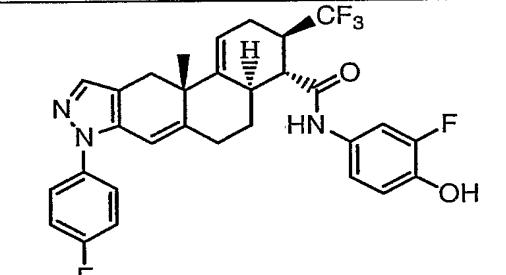
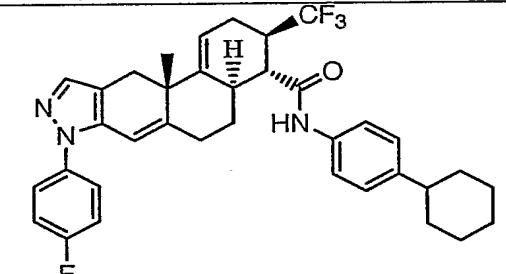
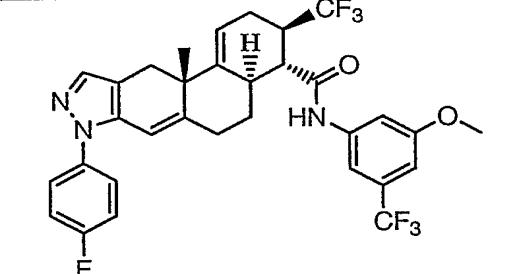
12		601
13		648
14		606
15		588
16		540

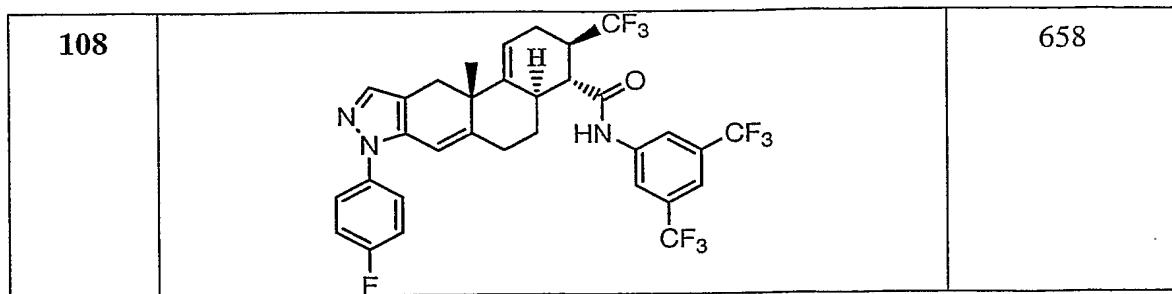
17		557
18		590
19		536
20		523
21		537

22		502
23		588
24		606
25		550
26		554

27		571
28		566
29		550
30		538
31		552

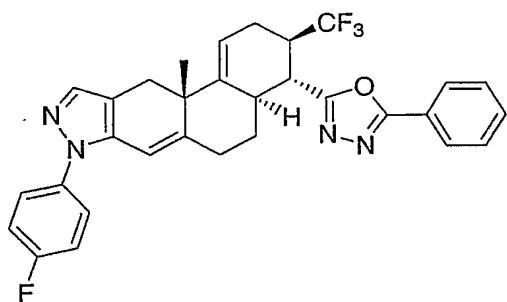
32		582
33		591
34		570
35		552
36		550

37		638
38		638
39		556
106		604
107		620



## EXAMPLE 40

5



(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(5-phenyl-1,3,4-oxadiazol-2-yl)-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole

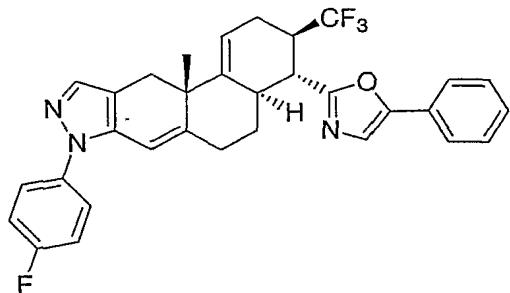
To a solution of (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylic acid (90 mg, 0.2 mmol) prepared as in EXAMPLE 2 Step A in  $\text{POCl}_3$  (2 mL) was added benzoic hydrazide (55 mg, 0.4 mmol), and the mixture was heated at 100 °C for 18h. The reaction mixture was cooled and poured into ice. It was made basic (~ pH 8) with conc.  $\text{NH}_4\text{OH}$  while cooling the mixture in ice/ $\text{H}_2\text{O}$  bath. Brine was added to the mixture and it was extracted with  $\text{CH}_2\text{Cl}_2$  three times. After drying over  $\text{Na}_2\text{SO}_4$ , it was filtered and concentrated under reduced pressure. The crude material was purified by preparative TLC eluting with 8%  $\text{EtOAc}/\text{CH}_2\text{Cl}_2$  to obtain 53.7 mg of the title compound.

$^1\text{H}$  NMR ( $\text{CDCl}_3$ , 500MHz):  $\delta$  8.03 (d,  $J$  = 6.9 Hz, 2H); 7.53-7.42 (m, 6H); 7.13 (t,  $J$  = 8.6 Hz, 2H); 6.18 (d,  $J$  = 1.4 Hz, 1H); 5.85 (d,  $J$  = 6.0 Hz, 1H); 3.26 (dd,  $J$  = 11, 9.8 Hz, 1H); 3.0 (m, 1H); 2.91 (d,  $J$  = 15.8 Hz, 1H); 2.81 (m, 1H); 2.55 (d,

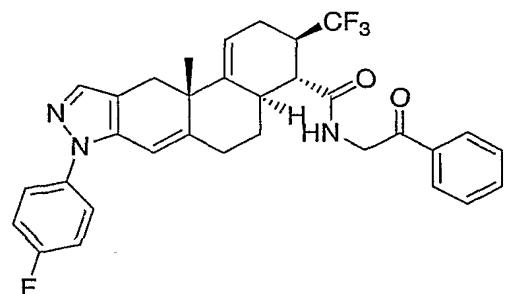
$J = 15.8$  Hz, 1H); 2.5 (m, 1H); 2.4 (m, 2H); 2.29 (m, 1H); 1.85 (m, 1H); 1.6 (m, 1H); 1.27 (s, 3H). Mass spectrum (ESI): 547.1 (M+1).

## EXAMPLE 41

5



10 (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(5-phenyl-1,3-oxazol-2-yl)-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole



15

Step A: (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-(2-oxo-2-phenylethyl)carboxamide The solution of (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylic acid (40.8 mg, 0.091 mmol) in  $\text{CH}_2\text{Cl}_2$  (1.0 mL) was cooled down to 0 °C, and to this was added oxalyl chloride (70  $\mu\text{L}$ , 2.0 M, 0.137 mmol) followed by 1 drop of DMF via pipet. The reaction mixture was stirred for 2h while slowly warming up to room temperature. The solvent was removed under reduced

20

Step B: (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-(2-oxo-2-phenylethyl)carboxamide The solution of (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-(2-oxo-2-phenylethyl)carboxamide (30.0 mg, 0.068 mmol) in  $\text{CH}_2\text{Cl}_2$  (1.0 mL) was cooled down to 0 °C, and to this was added oxalyl chloride (70  $\mu\text{L}$ , 2.0 M, 0.137 mmol) followed by 1 drop of DMF via pipet. The reaction mixture was stirred for 2h while slowly warming up to room temperature. The solvent was removed under reduced

pressure, and the residue was co-evaporated two times with toluene. After drying under high vacuum, the acid chloride was dissolved in  $\text{CH}_2\text{Cl}_2$  (1.0 mL), and to this was added 2-aminoacetophenone hydrochloride (18 mg, 0.1 mmol) followed by  $\text{Et}_3\text{N}$  (28  $\mu\text{L}$ , 0.2 mmol). The reaction mixture was stirred for 2h, then 10% aqueous 5  $\text{NH}_4\text{OH}$  was added. The aqueous layer was extracted with  $\text{CH}_2\text{Cl}_2$ , and combined extracts were washed with brine and dried over  $\text{Na}_2\text{SO}_4$ . The crude material was purified by preparative TLC eluting with 1:2 acetone:hexane to obtain 42 mg of the title compound.

10  $^1\text{H}$  NMR ( $\text{CDCl}_3$ , 500MHz):  $\delta$  7.97 (d,  $J$  = 7.6 Hz, 2H); 7.62-7.39 (m, 6H); 7.14 (t,  $J$  = 8.6 Hz, 2H); 6.82 (1 NH); 6.16 (s, 1H); 5.73 (d,  $J$  = 6.0 Hz, 1H); 4.91 (dd,  $J$  = 5, 19.9 Hz, 1H); 4.68 (dd,  $J$  = 3.5, 19.9 Hz, 1H); 2.86 (m, 1H); 2.87 (d,  $J$  = 15.8 Hz, 1H); 2.71 (m, 1H); 2.5 (d,  $J$  = 15.8 Hz, 1H); 2.44-2.21 (m, 5H); 2.01 (m, 1H); 1.5 (m, 1H); 1.22 (s, 3H). Mass spectrum (ESI): 564.2 (M+1).

15

Step B: (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(5-phenyl-1,3-oxazol-2-yl)-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole

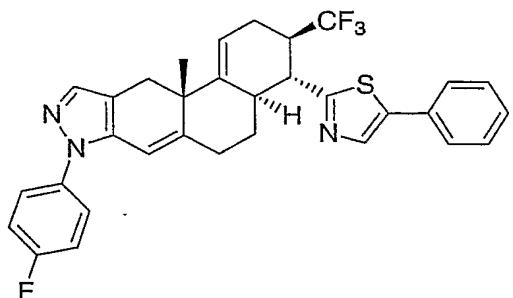
20 The solution of (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-(2-oxo-2-phenylethyl)carboxamide (17.4 mg, 0.031 mmol) in  $\text{POCl}_3$  (0.5 mL) was heated at 100 °C for 3h and cooled to room temperature. The reaction mixture was poured into ice/ $\text{H}_2\text{O}$  and made basic with conc.  $\text{NH}_4\text{OH}$  to pH 8 while cooling in ice bath (very exothermic). Brine was added and the aqueous layer was extracted with  $\text{CH}_2\text{Cl}_2$  three times. The combined organic layer was dried over  $\text{Na}_2\text{SO}_4$ , filtered and concentrated 25 under reduced pressure. The crude material was purified by preparative TLC eluting with 1:3 acetone:hexane system to obtain 12.2 mg of the title compound.

30  $^1\text{H}$  NMR ( $\text{CD}_3\text{OD}$ , 500MHz):  $\delta$  7.65 (d,  $J$  = 7.3 Hz, 2H); 7.45-7.39 (m, 6H); 7.32 (m, 1H); 7.22 (t,  $J$  = 8.7 Hz, 2H); 6.18 (s, 1H); 5.89 (d,  $J$  = 5.7 Hz, 1H); 3.08 (t,  $J$  = 10.6 Hz, 1H); 2.97 (m, 1H); 2.9 (d,  $J$  = 16 Hz, 1H); 2.84 (m, 1H); 2.6 (d,  $J$  = 16 Hz, 1H); 2.49 (m, 1H); 2.38 (m, 2H); 2.28 (m, 1H); 1.7 (m, 1H); 1.56 (m, 1H); 1.24 (s, 3H). Mass spectrum (ESI): 546.2 (M+1).

The following examples were synthesized by procedures analogous to that described in EXAMPLE 41:

Compound	Molecular Structure	LCMS (M+1) <sup>+</sup>
114		564
115		580
116		576
117		560

## EXAMPLE 42



5

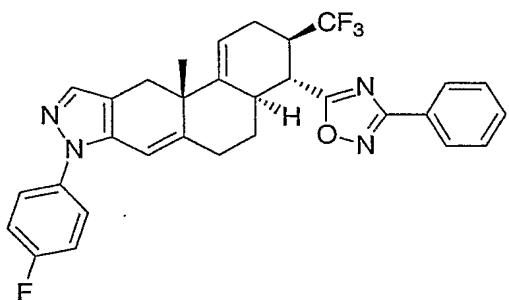
(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(5-phenyl-1,3-thiazol-2-yl)-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole

To a solution of (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-(2-oxo-2-phenylethyl)carboxamide (25.4 mg, 0.045 mmol) in toluene (1 mL) was added 10 Lawesson's reagent (73 mg, 0.18 mmol), and the mixture was heated at 100 °C for 3h. The reaction mixture was cooled and the solvent was removed under reduced pressure. The crude material was purified by preparative TLC eluting with 1:3 acetone:hexane system to give 18.4 mg of the title compound.

15 <sup>1</sup>H NMR (CD<sub>3</sub>OD, 500MHz): δ 7.98 (s, 1H); 7.59 (d, J = 7.6 Hz, 2H); 7.46-7.38 (m, 5H); 7.33 (t, J = 7.6 Hz, 1H); 7.24 (t, J = 8.7 Hz, 2H); 6.19 (s, 1H); 5.9 (d, J = 6.0 Hz, 1H); 3.24 (dd, J = 9.6, 11 Hz, 1H); 2.94 (m, 1H); 2.94 (d, J = 15.9 Hz, 1H); 2.83 (m, 1H); 2.6 (d, J = 15.9 Hz, 1H); 2.5 (m, 1H); 2.38 (m, 2H); 2.29 (m, 1H); 1.74 (m, 1H); 1.59 (m, 1H); 1.26 (s, 3H). Mass spectrum (ESI): 562.2 (M+1).

20

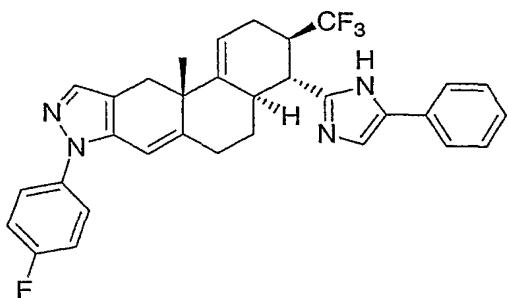
## EXAMPLE 43



5    (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(3-phenyl-1,2,4-oxadiazol-5-yl)-  
3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole    A  
 solution of (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-  
 3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylic acid (16.7 mg,  
 0.037 mmol) in CH<sub>2</sub>Cl<sub>2</sub> (0.5 mL) was cooled down to 0 °C, and to this was added  
 10    oxalyl chloride (28 µL, 2.0 M, 0.056 mmol) followed by 1 drop of DMF via pipet.  
 The reaction mixture was stirred for 2h while slowly warming up to room  
 temperature. The solvent was removed under reduced pressure, and the residue was  
 co-evaporated two times with toluene. After drying under high vacuum, the acid  
 chloride was dissolved in THF (0.5 mL) and benzamide oxime (16 mg., 0.12 mmol)  
 15    was added and the mixture was stirred at 65°C for 3 hours. The mixture was cooled to  
 room temperature and Bu<sub>4</sub>NF (40 µL of a 1.0 M solution in THF) was added. The  
 reaction was stirred overnight. The mixture was heated to and maintained at 65°C for  
 6 h, and then stirred a room temperature overnight. More Bu<sub>4</sub>NF (40 µL of a 1.0 M  
 20    solution in THF) was added and the reaction was heated to 65°C for 2 h. The mixture  
 was cooled and was diluted with EtOAc. The organic layer was washed with H<sub>2</sub>O and  
 brine, then dried over Na<sub>2</sub>SO<sub>4</sub>. The crude material was purified by preparative TLC  
 25    eluting with 1:3 acetone:hexane system to obtain 14.1 mg of the title compound.

1    <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500MHz): δ 8.08 (dd, J = 1.6, 8.0 Hz, 2H); 7.49-  
 7.42 (m, 6H); 7.14 (t, J = 8.6 Hz, 2H); 6.19 (s, 1H); 5.85 (d, J = 5.7 Hz, 1H); 3.27 (dd,  
 25    J = 9.6, 11.2 Hz, 1H); 3.04 (m, 1H); 2.93 (d, J = 15.8 Hz, 1H); 2.56 (d, J = 15.8 Hz,  
 1H); 2.51 (m, 1H); 2.39 (m, 2H); 2.29 (m, 1H); 1.78 (m, 1H); 1.58 (m, 1H); 1.27 (s,  
 3H). Mass spectrum (ESI): 547.2 (M+1).

## EXAMPLE 44



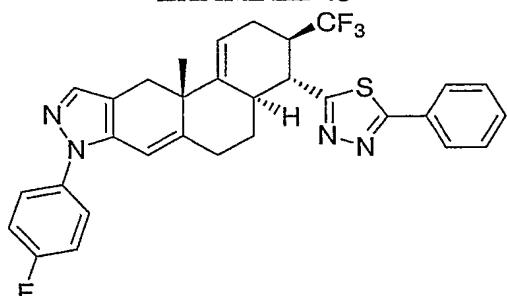
5

(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(5-phenyl-1H-imidazol-2-yl)-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole To a solution of (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carbaldehyde

10 (EXAMPLE 47) (12 mg, 0.028 mmol) in methanol (0.5 mL) was added phenyl glyoxal hydrate (11 mg, 0.084 mmol) and ammonium acetate (22 mg, 0.28 mmol). The mixture was heated at 65 °C for 4h. The reaction mixture was cooled down to room temperature and removed methanol under reduced pressure. The residue was dissolved in CH<sub>2</sub>Cl<sub>2</sub> and washed with saturated NaHCO<sub>3</sub>, H<sub>2</sub>O, and brine, respectively. The organic layer was dried over Na<sub>2</sub>SO<sub>4</sub>, then the crude material was purified by preparative TLC eluting with 1:2 EtOAc:hexane to give 5 mg of the title compound.

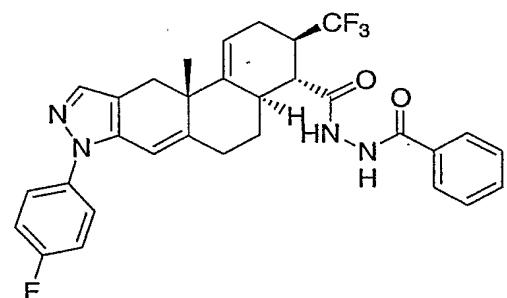
15 <sup>1</sup>H NMR (CD<sub>3</sub>OD, 500MHz): δ 7.63 (d, J = 7.5 Hz, 2H); 7.45-7.39 (m, 3H); 7.33 (t, J = 7.7 Hz, 2H); 7.29 (s, 1H); 7.24-7.18 (m, 3H); 6.15 (s, 1H); 5.88 (d, J = 6.0 Hz, 1H); 2.95 (d, J = 16.2 Hz, 1H); 2.93 (m, 2H); 2.83 (m, 1H); 2.59 (d, J = 16.2 Hz, 1H); 2.48 (m, 1H); 2.36 (m, 2H); 2.27 (m, 1H); 1.64 (m, 1H); 1.50 (m, 1H); 1.21 (s, 3H). Mass spectrum (ESI): 545.2 (M+1).

## EXAMPLE 45



(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(5-phenyl-1,3,4-thiadiazol-2-yl)-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole

5



Step A: (3R,4R,4aR,11aS)-N'-benzoyl-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carbohydrazide

10

The title compound was prepared according to the procedure described in EXAMPLE 41 Step A using benzoic hydrazide.

15 <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500MHz): δ 10.1 (d, J = 5.5 Hz, 1H); 9.89 (d, J = 5.5 Hz, 1H); 7.8 (d, J = 7.1 Hz, 2H); 7.49-7.35 (m, 6H); 7.14 (t, J = 8.6 Hz, 2H); 6.12 (s, 1H); 5.65 (d, J = 6.0 Hz, 1H); 2.79 (d, J = 15.8 Hz, 1H); 2.78 (m, 1H); 2.63 (m, 1H); 2.55 (dd, J = 9.4, 11.0 Hz, 1H); 2.46 (d, J = 15.8 Hz, 1H); 2.35 (m, 1H); 2.31 (m, 1H); 2.24 (m, 2H); 2.09 (m, 1H); 2.0 (m, 1H); 1.54 (m, 1H); 1.15 (s, 3H).

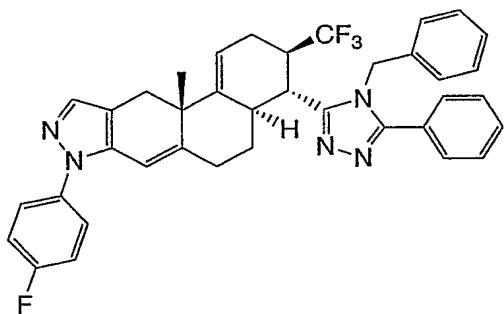
20 Step B: (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(5-phenyl-1,3,4-thiadiazol-2-yl)-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole The title compound was prepared according to the procedure described in EXAMPLE 42 starting from (3R,4R,4aR,11aS)-N'-benzoyl-8-(4-fluorophenyl)-11a-

methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carbohydrazide.

<sup>1</sup>H NMR (CDCl<sub>3</sub>, 500MHz):  $\delta$  7.94 (dd, J = 7.6, 2.0 Hz, 2H); 7.48-7.42 (m, 6H); 7.14 (t, J = 8.6 Hz, 2H); 6.17 (d, J = 1.4 Hz, 1H); 5.85 (d, J = 5.8 Hz, 1H); 3.45 (dd, J = 10.4, 9.0 Hz, 1H); 2.96 (m, 1H); 2.92 (d, J = 15.8 Hz, 1H); 2.84 (m, 1H); 2.54 (d, J = 15.8 Hz, 1H); 2.52 (m, 1H); 2.44 (m, 1H); 2.38 (m, 1H); 2.35 (m, 1H); 2.26 (m, 1H); 1.82 (m, 1H); 1.62 (m, 1H); 1.26 (s, 3H). Mass spectrum (ESI): 563.2 (M+1).

10

## EXAMPLE 46



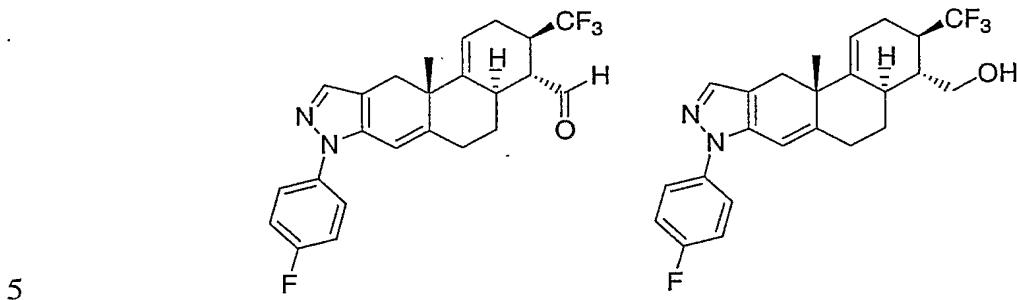
15 (3*R*,4*R*,4*aR*,11*aS*)-4-(4-benzyl-5-phenyl-4*H*-1,2,4-triazol-3-yl)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole

20 (3*R*,4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-4-(3-phenyl-1,2,4-oxadiazol-5-yl)-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole (EXAMPLE 43) (31.6 mg, 0.058 mmol) was dissolved in benzylamine (1 mL) in a sealed tube, and the mixture was heated at 150 °C for 13 days. It was cooled, loaded onto packed silica gel, and eluted with diethyl ether (50 mL) to remove benzyl amine followed by 5% MeOH/CH<sub>2</sub>Cl<sub>2</sub> to obtain the crude material. Further purification was done by a preparative TLC eluting with 3% MeOH/CH<sub>2</sub>Cl<sub>2</sub> to obtain 25 3.6 mg of the title compound.

<sup>1</sup>H NMR (CDCl<sub>3</sub>, 500MHz):  $\delta$  7.61-6.99 (15 aromatic H's); 6.07 (s, 1H); 5.75 (d, J = 5.9 Hz, 1H); 5.34 (d, J = 16.7 Hz, 1H); 5.07 (d, J = 16.7 Hz, 1H); 3.21 (m, 1H); 2.88 (d, J = 15.7 Hz, 1H); 2.82 (m, 1H); 2.75 (dd, J = 10.5, 8.9 Hz, 1H);

2.52 (m, 1H); 2.49 (d,  $J$  = 15.7 Hz, 1H); 2.33 (m, 1H); 2.06 (m, 2H); 1.38 (m, 1H); 1.14 (s, 3H); 0.55 (m, 1H). Mass spectrum (ESI): 636.4 (M+1).

EXAMPLES 47 and 48



(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carbaldehyde and  
[(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]methanol

10 To a solution of ethyl (11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylate (from EXAMPLE 1) (505 mg, 1.064 mmol) in  $\text{CH}_2\text{Cl}_2$  (15 mL) was added diisobutylaluminum hydride (2.13 mL of a 1M solution in  $\text{CH}_2\text{Cl}_2$ , 2.13 mmol) 15 at  $-78^\circ\text{C}$ . The mixture stirred for 2 hours at  $-78^\circ\text{C}$  and was quenched with Rochelle's salt. The organic layer was extracted with water, brine, and dried over  $\text{MgSO}_4$ . The crude product was purified by liquid chromatography, 5% to 100% ethyl acetate in hexanes to yield (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carbaldehyde (300 mg, 67 %) and [(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]methanol (108 mg, 24 %).

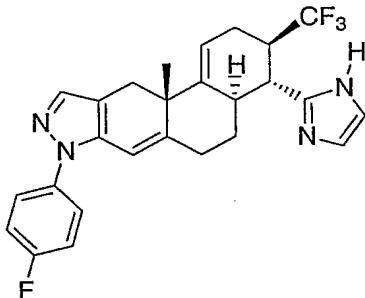
20 EXAMPLE 47: (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carbaldehyde

<sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz):  $\delta$  9.607 (s, 1H), 7.458 (m, 2H), 7.408 (s, 1H), 7.164 (m, 2H), 6.226 (s, 1H), 5.764 (s, 1H), 2.854 (d,  $J$  = 15.8 Hz, 1H), 2.767-2.692 (m, 2H), 2.531-2.518 (m, 1H), 2.484 (d, 15.8 Hz, 1H), 2.410-2.039 (m, 4H), 1.927 (m, 1H), 1.602 (m, 1H), 1.233 (s, 3H).

5 EXAMPLE 48: [(3*R*,4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]methanol

10 <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz):  $\delta$  7.451 (m, 2H), 7.395 (s, 1H), 7.146 (t,  $J$  = 8.7 Hz, 2H), 6.190 (s, 1H), 5.716 (s, 1H), 3.845 (dd,  $J$  = 3.2, 11.7 Hz, 1H), 3.660 (dd,  $J$  = 3.2, 11.7 Hz, 1H), 2.813 (d,  $J$  = 15.6 Hz, 1H), 2.551 (m, 1H), 2.470 (m, 1H), 2.398-2.246 (m, 5H), 2.057 (m, 1H), 1.757 (m, 1H), 1.520 (m, 1H), 1.210 (s, 3H).

EXAMPLE 49



15

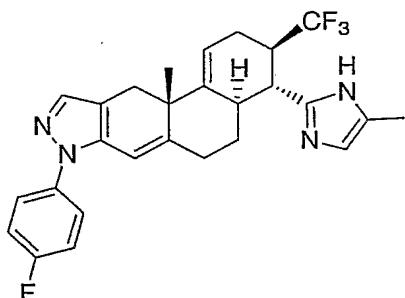
(3*R*,4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-4-(1*H*-imidazol-2-yl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole

To a solution of (3*R*,4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carbaldehyde (EXAMPLE 47) (144 mg, 0.334 mmol) in methanol (6 mL) was added glyoxal (58.4 mg, 0.998 mmol) and ammonium acetate (528 mg, 6.68 mmol) at room temperature. The reaction mixture was heated to reflux for 4 days, then the solvent was removed under reduced pressure. The crude mixture was diluted with ethyl acetate and washed with NaHCO<sub>3</sub>, H<sub>2</sub>O, brine, and dried over MgSO<sub>4</sub>. After removal of the solvent, the crude product was purified twice by preparative thin layer chromatography eluting with 4% methanol in dichloromethane and then once by flash

chromatography on silica gel using a gradient of 5% acetone in hexanes increasing to 100% acetone to give 54 mg of the title compound.

<sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz):  $\delta$  7.471 (m, 3H), 7.297 (t, J = 8.7 Hz, 2H), 6.209 (s, 1H), 5.905 (d, J = 6.0 Hz, 1H), 2.953 (t, J = 15.8 Hz, 1H), 2.915 (m, 2H), 2.752 (m, 1H), 2.643 (d, J = 15.8 Hz, 1H), 2.273-2.518 (m, 4H), 1.601 (m, 1H), 1.497 (m, 1H), 1.278 (s, 3H).

#### EXAMPLE 50



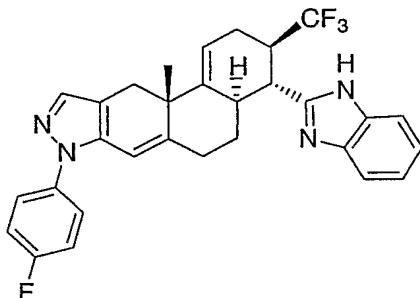
10

(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-4-(1H-imidazol-2-yl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole

The title compound was prepared from (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carbaldehyde (EXAMPLE 47) and pyruvic aldehyde according to the procedure described in EXAMPLE 49

<sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz):  $\delta$  7.476 (m, 3H), 7.297 (m, 3H), 6.269 (s, 1H), 6.011 (d, J = 6.8 Hz, 1H), 3.194 (t, J = 11.8 Hz, 1H), 2.940 (d, J = 17.8 Hz, 1H), 2.890 (m, 2H), 2.689 (d, J = 17.8 Hz, 1H), 2.657 (m, 1H), 2.477-2.39 (m, 6H), 1.692 (m, 1H), 1.535 (m, 1H), 1.313 (s, 3H).

#### EXAMPLE 51



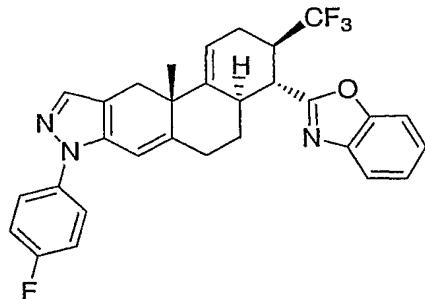
(3*R*,4*R*,4*aR*,11*aS*)-4-(1*H*-benzimidazol-2-yl)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole  
(3*R*,4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-

5      3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carbaldehyde  
 (EXAMPLE 47) (15 mg, 0.035 mmol) and 1,2-phenylenediamine (10 mg) in  
 nitrobenzene (0.4 mL) were heated to 150 °C for 4 hours. The nitrobenzene was  
 evaporated and the crude residue was purified by preparative thin layer  
 chromatography (1:1 EtOAc:hexane) to yield 3.2 mg of the title compound.

10     <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz):  $\delta$  7.575 (bs, 1H), 7.473 (m, 3H), 7.410 (s, 1H), 7.249  
 (m, 2H), 7.166 (t, J = 8.7 Hz, 2H), 6.153 (s, 1H), 5.814 (d, J = 5.9 Hz, 1H), 3.246 (m,  
 1H), 3.030 (t, J = 11.0 Hz, 1H), 2.853 (m, 2H), 2.521 (m, 2H), 2.383 (m, 2H), 2.258  
 (m, 2H), 1.790 (m, 1H), 1.504 (m, 1H), 1.275 (s, 3H).

15

## EXAMPLE 52

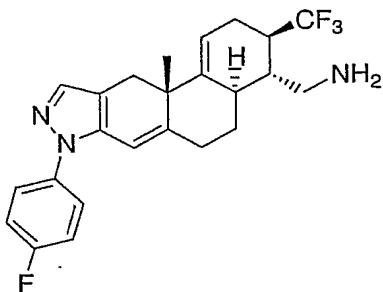


(3*R*,4*R*,4*aR*,11*aS*)-4-(1,3-benzoxazol-2-yl)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole

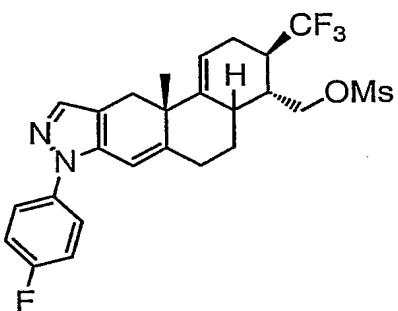
20     The title compound was prepared from (3*R*,4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carbaldehyde (EXAMPLE 47) and 2-aminophenol according to the procedure described in EXAMPLE 51.

25     <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz):  $\delta$  7.794 (m, 1H), 7.715 (m, 1H), 7.576 (m, 1H), 7.466-  
 7.413 (m, 4H), 7.242 (t, J = 8.2 Hz, 2H), 6.119 (s, 1H), 5.941 (d, J = 5.5 Hz, 1H),  
 3.354 (m, 2H), 3.053 (m, 2H), 2.699 (d, J = 16.1 Hz, 1H), 2.576 (m, 1H), 2.482 (m,  
 2H), 2.365 (m, 1H), 1.810 (m, 1H), 1.732 (m, 1H), 1.337 (s, 3H).

## EXAMPLE 53



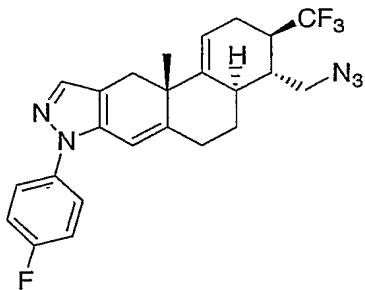
5 1-[3R,4R,4aR,11aS]-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]methanamine



10 Step A: [(11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]methanesulfonate

To a solution of [(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]methanol from EXAMPLE 48 (17 mg, 0.039 mmol) in  $\text{CH}_2\text{Cl}_2$  (2 mL) at 0°C was added diisopropylethylamine (10.1  $\mu\text{L}$ , 0.058 mmol) and methanesulfonyl chloride (36.4  $\mu\text{L}$ , 0.047 mmol). After 2hrs at 0°C the reaction was diluted with ethyl acetate and washed with  $\text{NaHCO}_3$ , 1N  $\text{HCl}$ , brine, and was dried with  $\text{MgSO}_4$ . The solvent was removed under reduced pressure to yield the title compound.  $^1\text{H}$  NMR ( $\text{CDCl}_3$ , 500 MHz):  $\delta$  7.515 (m, 2H), 7.444 (s, 1H), 7.197 (t,  $J$  = 8.7 Hz, 2H), 6.248 (s, 1H),

5.786 (s, 1H), 4.359 (m, 2H), 3.035 (s, 3H), 2.864 (d,  $J$  = 15.7 Hz, 1H), 2.580-2.309 (m, 7H), 2.141 (m, 1H), 2.049 (m, 1H), 1.565 (m, 1H), 1.257 (s, 3H).



5

Step B: (3*R*,4*R*,4*aR*,11*aS*)-4-(azidomethyl)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole

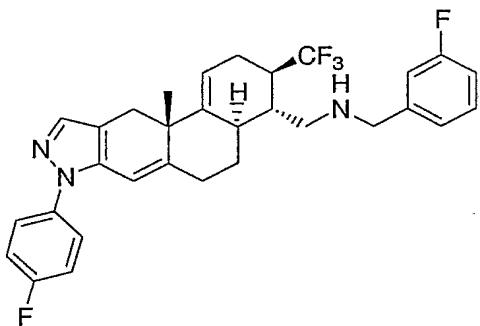
To a solution of [(11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]methyl methanesulfonate from Step A (120 mg, 0.234 mmol) in DMF (2.0 mL) was added sodium azide (20 mg, 0.375 mmol). The reaction mixture was heated to 50 °C for 4 hrs, cooled to RT, diluted with ethyl acetate. It was washed with H<sub>2</sub>O, brine, and dried over MgSO<sub>4</sub>. After removal of the solvent, the crude product was purified by column chromatography eluting with 5 % to 100% ethyl acetate in hexane to yield 90 mg of the title compound. <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz):  $\delta$  7.482 (m, 2H), 7.431 (s, 1H), 7.179 (m, 2H), 6.237 (s, 1H), 5.748 (m, 1H), 3.654 (m, 1H), 3.554 (m, 1H), 2.838 (d,  $J$  = 15.8 Hz, 1H), 2.222-2.504 (m, 6H), 2.066 (m, 1H), 1.868 (m, 1H), 1.521 (m, 1H), 1.238 (s, 3H).

20 Step C: 1-[*(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]methanamine*

To a solution of the intermediate from Step B (90 mg, 0.208 mmol) in THF/H<sub>2</sub>O (2.08/0.23 mL) was added triphenylphosphine (107.6 mg, 0.171 mmol) at room temperature. The reaction mixture was heated to 50 °C for 4 hours, cooled to RT and the solvent was removed under reduced pressure. The crude material was

purified by preparative thin layer chromatography eluting was 5% 2M NH<sub>3</sub> in MeOH/CH<sub>2</sub>Cl<sub>2</sub> to obtain 40 mg of the title compound. <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz): δ 7.968 (bs, 2H), 7.556 (s, 1H), 7.450 (m, 3H), 7.217 (t, J = 8.2 Hz, 2 H), 6.118 (s, 1H), 5.777 (s, 1H), 3.052 (m, 2H), 2.854 (m, 1H), 2.538 (m, 1H), 2.429 (m, 3H), 5 2.252 (m, 3H), 2.037 (m, 2H), 1.487 (m, 1H), 1.226 (s, 3H).

## EXAMPLE 54

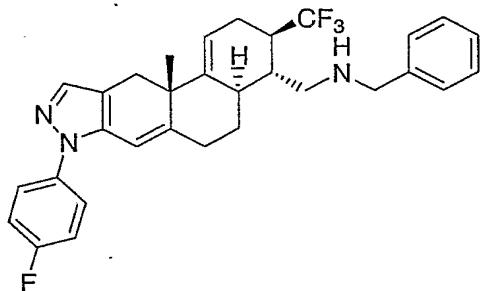


10

1-[(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-N-(3-fluorobenzyl)methanamine

To a solution of (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carbaldehyde from EXAMPLE 47 (11 mg, 0.0254 mmol) in 1,2-dichloroethane (0.5 mL) was added 3-fluorobenzylamine (4.80 mg, 0.381 mmol) at RT. After 2 hours, sodium triacetoxyborohydride (10.5 mg, 0.0381 mmol) was added and the reaction mixture was allowed to stir overnight. The reaction was quenched with NH<sub>4</sub>Cl, 15 diluted with CH<sub>2</sub>Cl<sub>2</sub>, and the organic layer was washed with H<sub>2</sub>O, brine, and dried over MgSO<sub>4</sub>. The crude product was purified via HPLC to yield the title compound. <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz): δ 7.473 (m, 2H), 7.398 (m, 1H), 7.232 (m, 1H), 7.169 (t, J = 8.2 Hz, 2H), 7.074 (m, 2H), 6.917 (t, J = 8.0 Hz, 1H), 6.202 (s, 1H), 5.676 (s, 1H), 3.815 (m, 1H), 3.743 (d, J = 13.5 Hz, 1H), 2.760 (m, 2H), 2.503 (m, 3H), 2.379 (d, J = 13.5 Hz, 1H), 2.232 (m, 4H), 1.860 (m, 1H), 1.529 (m, 2H), 1.201 (s, 3H).

## EXAMPLE 55

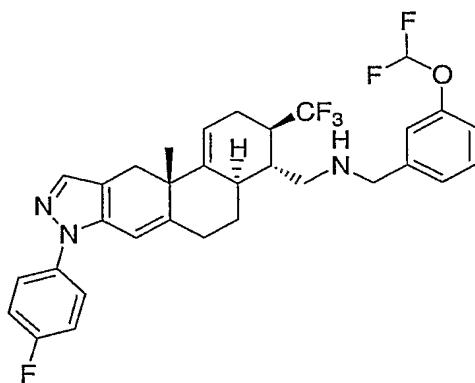


5 1-[3R,4R,4aR,11aS]-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-N-benzylmethanamine

10 The title compound was prepared from (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-carbaldehyde from EXAMPLE 47 and benzylamine according to the procedure described in EXAMPLE 54.

15 <sup>1</sup>H NMR (CDCl<sub>3</sub>, 500 MHz):  $\delta$  7.483 (m, 2H), 7.410 (s, 1H), 7.274 (m, 4H), 7.228 (m, 1H), 7.173 (t, J = 8.5 Hz, 2H), 6.197 (s, 1H), 5.666 (s, 1H), 3.806 (m, 2H), 2.775 (m, 2H), 2.584 (m, 2H), 2.485 (m, 1H), 2.338 (d, J = 15.6 Hz, 1H), 2.247 (m, 4H), 1.870 (m, 1H), 15.42 (m, 1H), 1.201 (s, 3H).

## EXAMPLE 56

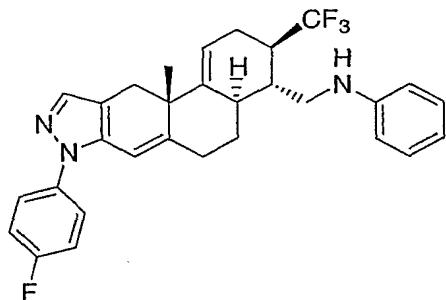


20 1-[3R,4R,4aR,11aS]-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-N-benzylmethanamine

The title compound was prepared from (3*R*,4*R*,4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carbaldehyde from EXAMPLE 47 and 3-(difluoromethoxy)benzylamine according to the procedure described in EXAMPLE 54.  $^1\text{H}$  NMR ( $\text{CDCl}_3$ , 500 MHz):  $\delta$  7.472 (m, 2H), 7.405 (s, 1H), 7.269 (m, 1H), 7.170 (m, 3H), 7.096 (s, 1H), 6.988 (d,  $J$  = 8.0 Hz, 1H), 6.471 (t,  $J_{\text{HF}}$  = 74.2 Hz, 1H), 6.203 (s, 1H), 5.677 (s, 1H), 3.815 (m, 2H), 2.778 (m, 2H), 2.570 (m, 3H), 2.347 (d,  $J$  = 15.8 Hz, 1H), 2.264 (m, 4H), 1.852 (m, 1H), 1.556 (m, 1H).

10

## EXAMPLE 57

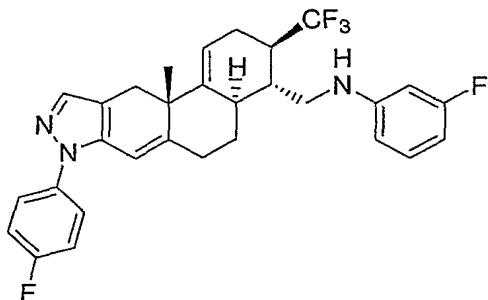


1-[3*R*,4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]-N-benzylmethanamine

The title compound was prepared from (3*R*,4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carbaldehyde from EXAMPLE 47 and aniline according to the procedure described in EXAMPLE 54.  $^1\text{H}$  NMR ( $\text{CDCl}_3$ , 500 MHz):  $\delta$  7.588 (s, 1H), 7.456 (m, 2H), 7.215 (m, 4H), 6.914 (t,  $J$  = 8.1 Hz, 1H), 6.806 (d,  $J$  = 6.806, 2H), 6.137 (s, 1H), 5.772 (s, 1H), 5.051 (bs, 1H), 3.305 (m, 2H), 2.829 (d,  $J$  = 15.8 Hz, 1H), 2.497 (m, 1H), 2.436 (d,  $J$  = 15.8 Hz, 1H), 2.365 (m, 1H), 2.278 (m, 1H), 2.156 (m, 1H), 2.006 (m, 1H), 1.662 (m, 1H), 1.240 (s, 3H).

25

## EXAMPLE 58



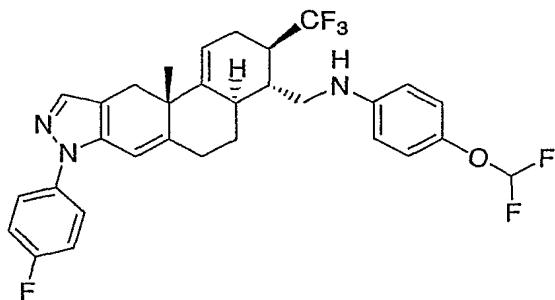
5 *N-[(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]methyl]-3-fluoroaniline*

The title compound was prepared from (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carbaldehyde from EXAMPLE 47 and 3-fluoroaniline

10 according to the procedure described in EXAMPLE 54.  $^1\text{H}$  NMR ( $\text{CDCl}_3$ , 500 MHz):  $\delta$  7.620 (s, 1H), 7.438 (m, 2H) 7.198 (t,  $J$  = 6.4 Hz, 2H), 7.087 (m, 1H), 6.388 (m, 2H), 6.311 (m, 1H), 6.121 (s, 1H), 5.771 (s, 1H), 4.817 (bs, 1H), 3.214 (d,  $J$  = 5.5 Hz, 2H), 2.778 (d,  $J$  = 15.8 Hz, 1H), 2.453 (d, 15.8 Hz, 1H), 2.408 (m, 2H), 2.352 (m, 2H), 2.297 (m, 2H), 2.095 (m, 1H), 1.985 (m, 1H), 1.683 (m, 1H), 1.238 (s, 3H).

15

## EXAMPLE 59

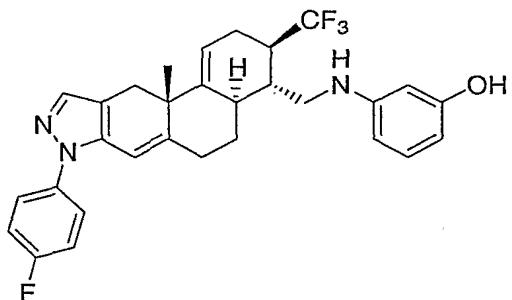


20 *N-[(3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]methyl]-3-(difluoromethoxy)aniline*

The title compound was prepared from  $(3R,4R,4aR,11aS)$ -8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carbaldehyde from EXAMPLE 47 and 4-difluoromethoxy aniline according to the procedure described EXAMPLE 54.  $^1\text{H}$  NMR ( $\text{CDCl}_3$ , 500 MHz):  $\delta$  7.861 (bs, 1H), 7.681 (s, 1H), 7.458 (m, 2H), 7.250 (t,  $J$  = 14.0 Hz, 2H), 7.160 (t,  $J$  = 8.0 Hz, 1H), 6.634-6.336 (m, 3H), 6.129 (s, 1H), 5.791 (s, 1H), 3.265 (d,  $J$  = 4.6 Hz, 2H), 2.823 (d,  $J$  = 16.4 Hz, 1H), 2.514-2.318 (m, 7H), 2.117 (m, 1H), 2.022 (m, 1H), 1.700 (m, 1H), 1.266 (s, 3H).

10

## EXAMPLE 60

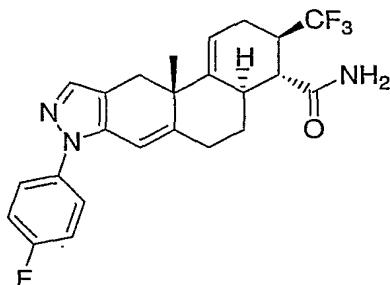


3-[( $(3R,4R,4aR,11aS)$ -8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl)methyl]amino)phenol

The title compound was prepared from  $(3R,4R,4aR,11aS)$ -8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carbaldehyde from EXAMPLE 47 and 3-hydroxyaniline according to the procedure described in EXAMPLE 54.  $^1\text{H}$  NMR ( $\text{CD}_3\text{OD}$ , 500 MHz):  $\delta$  10.061 (s, 1H), 7.477 (m, 1H), 7.449 (s, 1H), 7.249 (t,  $J$  = 12.8 Hz, 2H), 7.117 (m, 2H), 6.915 (d,  $J$  = 8.0 Hz, 1H), 6.558 (dd,  $J$  = 1.8 Hz, 8.0 Hz, 1H), 6.221 (s, 1H), 5.860 (m, 1H), 2.898 (d,  $J$  = 15.8 Hz, 1H), 2.782 (m, 1H), 2.689 (m, 1H), 2.545 (m, 2H), 2.432 (m, 3H), 2.244 (m, 2H), 1.978 (m, 1H), 1.602 (m, 1H), 1.251 (s, 1H).

25

## EXAMPLE 61



5 (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxamide

To a stirred solution of (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylic acid from EXAMPLE 2 Step A (45 mg, 0.10 mmol) in DMF (600  $\mu$ l)

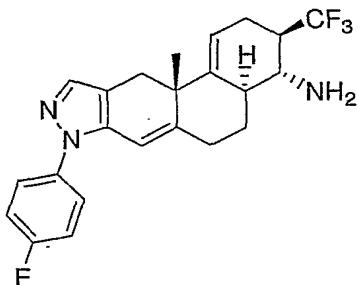
10 was added benzotriazol-1-yloxy-tris(dimethylamino)phosphonium hexafluorophosphate (66 mg, 0.15 mmol), 1-hydroxybenzotriazole hydrate (20 mg, 0.15 mmol), N,N-diisopropylethylamine (70  $\mu$ l, 0.40 mmol), and NH<sub>4</sub>Cl (11 mg, 0.20 mmol). The reaction mixture was stirred under N<sub>2</sub> at room temperature for 2 hours. It was then diluted with ethyl acetate and washed 2x with water followed by brine. The

15 organic layer was dried over Na<sub>2</sub>SO<sub>4</sub> and concentrated under reduced pressure. The product was purified by preparative thin-layer chromatography, eluting with 3:2 ethyl acetate-hexanes to yield 32 mg of the title compound.

Mass spectrum (ESI) 446 (M+1).

<sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD):  $\delta$  1.26 (s, 3H); 1.59 (m, 1H); 2.01 (m, 1H); 2.24 (m, 1H); 2.42 (m, 4H); 2.60 (½ ABq, J=15.8 Hz, 1H); 2.67 (m, 2H); 2.88 (½ ABq, J=15.8 Hz, 1H); 5.85 (br d, J=6.2 Hz, 1H); 6.25 (s, 1H); 7.28 (m, 2H); 7.44 (s, 1H); 7.49 (m, 2H).

## EXAMPLE 62



5 (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine

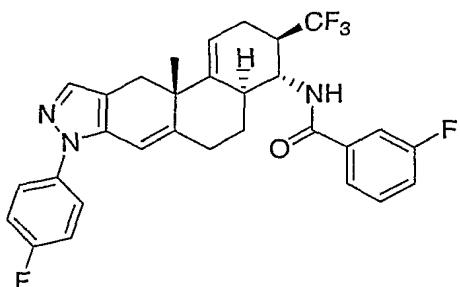
To a stirred solution of *3R,4R,4aR,11aS*-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxamide from EXAMPLE 61 (268 mg, 0.602 mmol) in 1,4-dioxane (4.5 ml), under N<sub>2</sub>, was added NaOCl (10-13%) (1.2 ml), 2N aqueous NaOH (2.1 ml), and water (2.1 ml). The reaction mixture was heated at 40°C for 1 hour. The reaction mixture was diluted with water and extracted 3x with ethyl acetate. The combined organic extracts were washed with brine, dried over Na<sub>2</sub>SO<sub>4</sub>, and concentrated under reduced pressure to yield 226 mg of the title compound.

15 Mass spectrum (ESI) 418 (M+1).

<sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD): δ 1.25 (s, 3H); 1.61 (m, 1H); 2.32 (m, 7H); 2.52 (½ ABq, J=15.8 Hz, 1H); 2.88 (½ ABq, J=15.8 Hz, 1H); 2.95 (app t, J=8.0 Hz, 1H); 5.81 (br d, J=6.0 Hz, 1H); 6.25 (s, 1H); 7.29 (m, 2H); 7.43 (s, 1H); 7.49 (m, 2H).

20

## EXAMPLE 63



N-[*(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-3-fluorobenzamide*

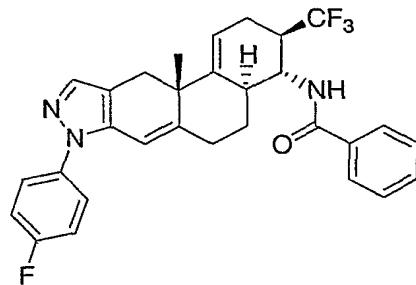
To a stirred solution of (*3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine* from EXAMPLE 62 (10 mg, 0.024 mmol) in methylene chloride (0.5 ml) was added diisopropylethylamine (8.4  $\mu$ l, 0.048 mmol) followed by 3-fluorobenzoyl chloride (4.4  $\mu$ l, 0.036 mmol). The reaction mixture was stirred under  $N_2$  at room temperature for 35 min. It was then concentrated under reduced pressure, diluted with ethyl acetate, and washed with saturated  $NaHCO_3$ , 2N aqueous HCl, and brine. The organic layer was dried over  $Na_2SO_4$ , and concentrated under reduced pressure. The product was purified by preparative thin-layer chromatography, eluting with 95:5 dichloromethane-methanol to yield 8 mg of the title compound.

Mass spectrum (ESI) 540 (M+1).

$^1H$  NMR (500 MHz,  $CD_3OD$ ):  $\delta$  1.28 (s, 3H); 1.72 (m, 1H); 2.03 (m, 1H); 2.44 (m, 4H); 2.61 ( $\frac{1}{2}$  ABq,  $J=15.8$  Hz, 1H); 2.70 (m, 2H); 2.89 ( $\frac{1}{2}$  ABq,  $J=15.8$  Hz, 1H); 4.27 (app t,  $J=10.9$  Hz, 1H); 5.87 (br d,  $J=6.0$  Hz, 1H); 6.24 (s, 1H); 7.29 (m, 3H); 7.44 (s, 1H); 7.51 (m, 4H); 7.64 (br d,  $J=8.0$  Hz, 1H).

20

EXAMPLE 64



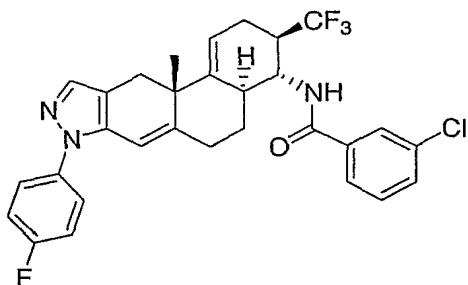
N-[*(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-3-fluorobenzamide*

25 The title compound was prepared from (*3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine* from EXAMPLE 62 and benzoyl chloride according to the procedure described in EXAMPLE 63.

Mass spectrum (ESI) 522 (M+1).

<sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD): δ 1.28 (s, 3H); 1.73 (m, 1H); 2.04 (m, 1H); 2.43 (m, 4H); 2.61 (½ ABq, J=15.8 Hz, 1H); 2.70 (m, 2H); 2.90 (½ ABq, J=15.8 Hz, 1H); 4.28 (app t, J=10.8 Hz, 1H); 5.87 (br d, J=6.0 Hz, 1H); 6.24 (s, 1H); 7.28 (app t, J=8.7 Hz, 2H); 7.44 (s, 1H); 7.48 (m, 4H); 7.55 (app t, J=7.1 Hz, 1H); 7.81 (br d, J=7.5 Hz, 2H).

#### EXAMPLE 65



10

N-[(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-3-chlorobenzamide

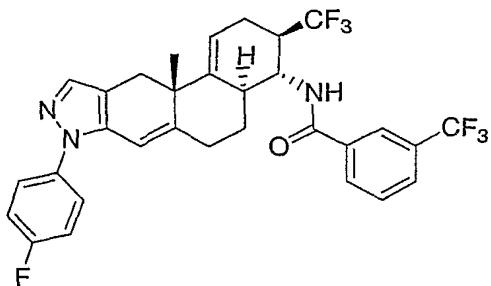
The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine from EXAMPLE 62 and 3-chlorobenzoyl chloride according to the procedure described in EXAMPLE 63. Triethylamine was used as the base.

Mass spectrum (ESI) 556 (M+1).

<sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD): δ 1.24 (s, 3H); 1.68 (m, 1H); 1.99 (m, 1H); 2.36 (m, 3H); 2.48 (m, 1H); 2.57 (½ ABq, J=15.8 Hz, 1H); 2.65 (m, 2H); 2.85 (½ ABq, J=15.8 Hz, 1H); 4.23 (app t, J=10.3 Hz, 1H); 5.83 (br d, J=6.2 Hz, 1H); 6.20 (s, 1H); 7.24 (m, 2H); 7.41 (s, 1H); 7.44 (m, 3H); 7.53 (m, 1H); 7.70 (br d, J=8.0 Hz, 1H); 7.78 (app t, J=1.7 Hz, 1H).

25

## EXAMPLE 66



5 *N*-[3*R*,4*R*,4*aS*,11*aS*]-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]-3-(trifluoromethyl)benzamide

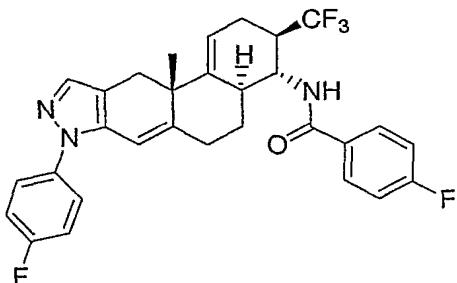
The title compound was prepared from (3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine from EXAMPLE 62 and 3-trifluoromethylbenzoyl chloride according to the procedure described in EXAMPLE 63. Triethylamine was used as the base.

Mass spectrum (ESI) 590 (M+1).

<sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD): δ 1.25 (s, 3H); 1.69 (m, 1H); 2.01 (m, 1H); 2.36 (m, 3H); 2.49 (m, 1H); 2.58 (½ ABq, J=15.8 Hz, 1H); 2.67 (m, 2H); 2.86 (½ ABq, J=15.8 Hz, 1H); 4.26 (app t, J=10.8 Hz, 1H); 5.84 (br d, J=6.1 Hz, 1H); 6.21 (s, 1H); 7.24 (app t, J=8.7 Hz, 2H); 7.41 (s, 1H); 7.45 (m, 2H); 7.67 (app t, J=7.7 Hz, 1H); 7.83 (br d, J=7.7 Hz, 1H); 8.04 (br d, J=7.8 Hz, 1H); 8.09 (s, 1H).

20

## EXAMPLE 67



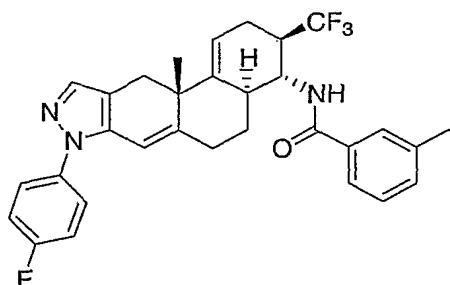
*N-[*(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]-4-fluorobenzamide**

The title compound was prepared from (*3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine* from EXAMPLE 62 and 4-fluorobenzoyl chloride according to the procedure described in EXAMPLE 63.

Mass spectrum (ESI) 540 (M+1).

EXAMPLE 68

10



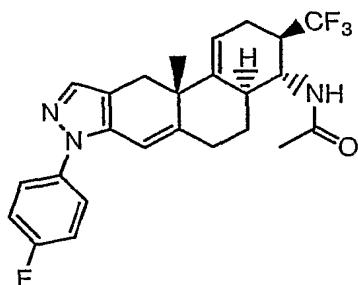
*N-[*(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]-3-methylbenzamide**

The title compound was prepared from (*3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine* from EXAMPLE 62 and 3-methylbenzoyl chloride according to the procedure described in EXAMPLE 63.

Mass spectrum (ESI) 536 (M+1).

20

EXAMPLE 69



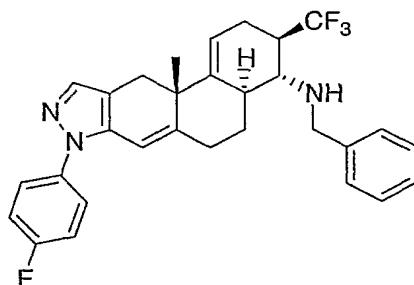
*N*-(3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]acetamide

The title compound was prepared from (3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine from EXAMPLE 62 and acetyl chloride according to the procedure described in EXAMPLE 63.

Mass spectrum (ESI) 460 (M+1).

EXAMPLE 70

10



*(3R,4R,4aS,11aS)-N*-benzyl-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine

15 To a mixture of (3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine from EXAMPLE 62 (15 mg, 0.036 mmol) in 1,2-dichloroethane (0.5 ml) was added benzaldehyde (5  $\mu$ l, 0.047 mmol) followed by glacial acetic acid (2  $\mu$ l, 0.036 mmol). After stirring under N<sub>2</sub> for 30 minutes at room temperature, sodium

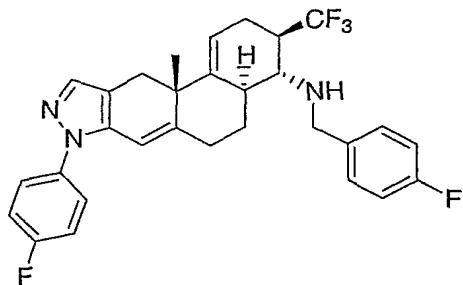
20 triacetoxyborohydride (15 mg, 0.072 mmol) was added, and the mixture was stirred at room temperature overnight. The reaction mixture was quenched with 4 ml of 2N aqueous NaOH and extracted 3x with dichloromethane. The combined organic extracts were washed with brine, dried over Na<sub>2</sub>SO<sub>4</sub>, and concentrated under reduced pressure. The product was purified by flash column chromatography on silica gel

25 eluting with 10%-100% ethyl acetate in hexanes, followed by a second purification by preparative thin-layer chromatography, eluting with 2:3 ethyl acetate-hexanes to yield 9 mg of the title compound.

Mass spectrum (ESI) 508 (M+1).

<sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD): δ 1.22 (s, 3H); 1.55 (m, 1H); 2.02 (m, 1H); 2.27 (m, 3H); 2.47 (m, 2H); 2.49 (½ ABq, J=15.8 Hz, 1H); 2.59 (m, 1H); 2.86 (½ ABq, J=15.8 Hz, 1H); 2.93 (app t, J=6.8 Hz, 1H); 3.82 (Abq, J=13.0 Hz, J=26.1 Hz, 2H); 5.77 (br s, 1H); 6.23 (s, 1H); 7.22 (m, 1H); 7.29 (m, 4H); 7.34 (br d, J=7.5 Hz, 2H); 7.43 (s, 1H); 5 7.49 (m, 2H).

## EXAMPLE 71



10

(3R,4R,4aS,11aS)-N-(4-fluorobenzyl)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine

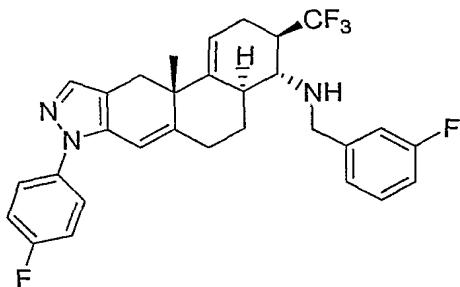
The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine from EXAMPLE 62 and 4-fluorobenzaldehyde according to the procedure described in EXAMPLE 70.

Mass spectrum (ESI) 526 (M+1).

<sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD): δ 1.22 (s, 3H); 1.57 (m, 1H); 2.04 (m, 1H); 2.27 (m, 3H); 2.47 (m, 2H); 2.49 (½ ABq, J=15.8 Hz, 1H); 2.58 (m, 1H); 2.85 (½ ABq, J=15.8 Hz, 1H); 2.91 (app t, J=7.3 Hz, 1H); 3.81 (Abq, J=13.0 Hz, J=25.8 Hz, 2H); 5.77 (br s, 1H); 6.23 (s, 1H); 7.02 (m, 2H); 7.28 (m, 2H); 7.36 (m, 2H); 7.43 (s, 1H); 7.49 (m, 2H).

25

## EXAMPLE 72



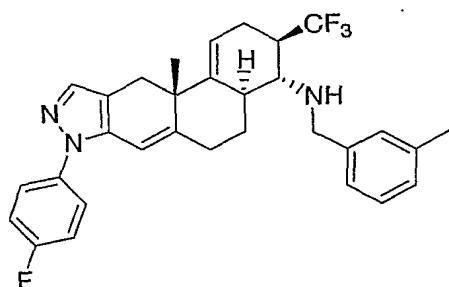
5 (3R,4R,4aS,11aS)-N-(3-fluorobenzyl)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine

The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine from EXAMPLE 62 and 3-fluorobenzaldehyde according to the procedure described in EXAMPLE 70.

Mass spectrum (ESI) 526 (M+1).

<sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD): δ 1.22 (s, 3H); 1.58 (m, 1H); 2.05 (m, 1H); 2.27 (m, 3H); 2.47 (m, 2H); 2.49 (½ ABq, J=15.8 Hz, 1H); 2.58 (m, 1H); 2.86 (½ ABq, J=15.8 Hz, 1H); 2.92 (app t, J=5.9 Hz, 1H); 3.84 (Abq, J=14.0 Hz, J=25.0 Hz, 2H); 5.77 (br s, 1H); 6.23 (s, 1H); 6.94 (m, 1H); 7.14 (m, 2H); 7.29 (m, 3H); 7.42 (s, 1H); 7.48 (m, 2H).

## EXAMPLE 73



20

(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-N-(3-methylbenzyl)-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine

The title compound was prepared from (3*R*,4*R*,4a*S*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine EXAMPLE 62 and 3-methylbenzaldehyde according to the procedure described in EXAMPLE 70.

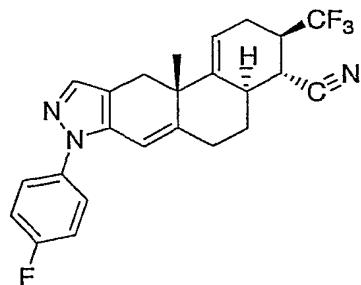
5 Mass spectrum (ESI) 521(M+1).

<sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD): δ 1.22 (s, 3H); 1.55 (m, 1H); 1.99 (m, 1H); 2.27 (m, 3H); 2.30 (s, 3H); 2.47 (½ ABq, J=15.8 Hz, 1H); 2.48 (m, 2H); 2.59 (m, 1H); 2.84 (½ ABq, J=15.8 Hz, 1H); 2.94 (app t, J=5.5 Hz, 1H); 3.78 (Abq, J=12.8 Hz, J=32.0 Hz, 2H); 5.77 (br s, 1H); 6.22 (s, 1H); 7.04 (br d, J=7.6 Hz, 1H); 7.12 (br d, J=7.7 Hz, 1H); 7.18 (m, 2H); 7.28 (app t, J=8.5 Hz, 2H); 7.43 (s, 1H); 7.49 (m, 2H).

10

15

#### EXAMPLE 74



(3*R*,4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carbonitrile

To a solution of (3*R*,4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxamide from EXAMPLE 61 (20 mg) in DMF (200 µl) was added cyanuric chloride (8mg). The reaction mixture was stirred under N<sub>2</sub> at room temperature for 1.75 hours. It was then diluted with water and extracted 3x with ethyl acetate. The combined organic layers were washed with brine, dried over Na<sub>2</sub>SO<sub>4</sub>, and concentrated under reduced pressure. The product was purified by flash column chromatography on silica gel eluting with 10%-100% ethyl acetate in hexanes to yield 13 mg of the title compound.

20

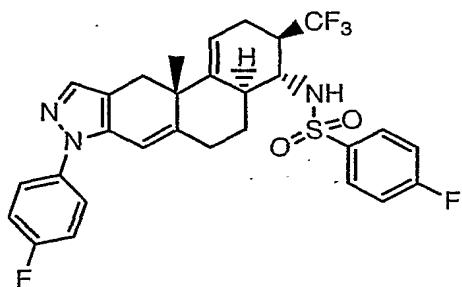
25

Mass spectrum (ESI) 428 (M+1).

<sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD): δ 1.26 (s, 3H); 1.72 (m, 1H); 2.29 (m, 3H); 2.45 (m, 2H); 2.59 (½ ABq, J=15.8 Hz, 1H); 2.87 (m, 4H); 5.87 (br d, J=6.0 Hz, 1H); 6.30 (s, 1H); 7.29 (m, 2H); 7.44 (s, 1H); 7.49 (m, 2H).

5

## EXAMPLE 75



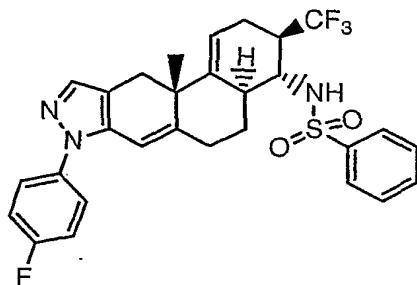
10 N-[(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-4-fluorobenzenesulfonamide

To a mixture of (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine from EXAMPLE 62 (15 mg, 0.036 mmol) in THF (0.5 ml) was added 4-fluorobenzenesulfonyl chloride (11 mg, 0.054 mmol) followed by diisopropylethylamine (9 µl, 0.054 mmol). After stirring under N<sub>2</sub> at room temperature for ca. 2 hours, the solvent was removed under reduced pressure. The product was purified by preparative thin-layer chromatography, eluting with 95:5 dichloromethane-methanol to yield 12 mg of the title compound.

20 Mass spectrum (ESI) 576 (M+1).

25 <sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD): δ 1.20 (s, 3H); 1.52 (m, 1H); 1.76 (m, 1H); 2.24 (m, 4H); 2.48 (½ ABq, J=15.8 Hz, 1H); 2.50 (m, 2H); 2.71 (½ ABq, J=15.8 Hz, 1H); 3.60 (app t, J=8.0 Hz, 1H); 5.78 (br s, 1H); 6.17 (s, 1H); 7.23 (app t, J=8.7 Hz, 2H); 7.29 (app t, J=8.7 Hz, 2H); 7.43 (s, 1H); 7.48 (m, 2H); 7.89 (m, 2H).

## EXAMPLE 76

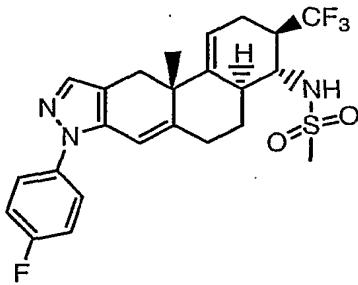


5 *N*-[*(3R,4R,4aS,11aS)*-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]benzenesulfonamide

The title compound was prepared from (*3R,4R,4aS,11aS*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine from EXAMPLE 62 and benzenesulfonyl chloride according to the procedure described in EXAMPLE 75.

10 Mass spectrum (ESI) 558 (M+1).

## EXAMPLE 77



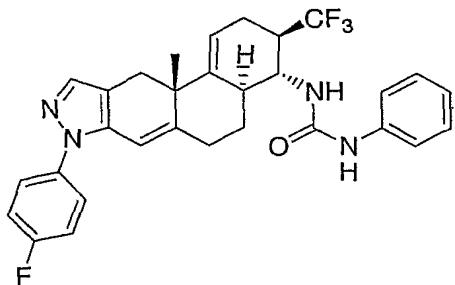
15

*N*-[*(3R,4R,4aS,11aS)*-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]methanesulfonamide

The title compound was prepared from (*3R,4R,4aS,11aS*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine from EXAMPLE 62 and methanesulfonyl chloride according to the procedure described in EXAMPLE 75.

20 Mass spectrum (ESI) 496 (M+1).

## EXAMPLE 78



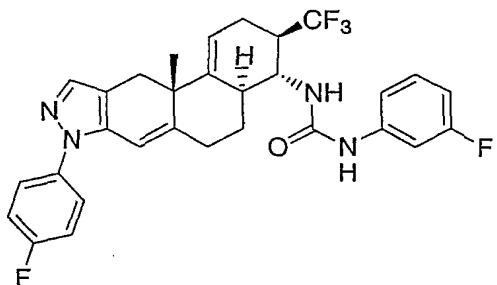
5 *N*-[*(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-*N'*-phenylurea*

To a solution of (*3R,4R,4aS,11aS*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine from EXAMPLE 62 (15 mg, 0.036 mmol) in dichloromethane (0.5 ml) was added phenyl isocyanate (4.1  $\mu$ l, 0.038 mmol). After stirring under  $N_2$  at room temperature for 3 hours, the solvent was removed under reduced pressure. The product was purified by flash column chromatography on silica gel eluting with 1%-100% methanol in dichloromethane, followed by a second purification by preparative thin-layer chromatography, eluting with 95:5 dichloromethane-methanol to yield 13 mg of the title compound.

15 Mass spectrum (ESI) 537 ( $M+1$ ).

$^1H$  NMR (500 MHz,  $CD_3OD$ ):  $\delta$  1.27 (s, 3H); 1.72 (m, 1H); 2.10 (m, 1H); 2.41 (m, 4H); 2.59 (m, 2H); 2.59 ( $\frac{1}{2}$  ABq,  $J=15.8$  Hz, 1H); 2.89 ( $\frac{1}{2}$  ABq,  $J=15.8$  Hz, 1H); 3.93 (app t,  $J=9.6$  Hz, 1H); 5.83 (br d,  $J=5.3$  Hz, 1H); 6.25 (s, 1H); 6.99 (app t,  $J=6.9$  Hz, 1H); 7.27 (m, 4H); 7.34 (br d,  $J=8.3$  Hz, 2H); 7.44 (s, 1H); 7.49 (m, 2H).

## EXAMPLE 79



5 *N*-[(3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]-*N*'-(3-fluorophenyl)urea

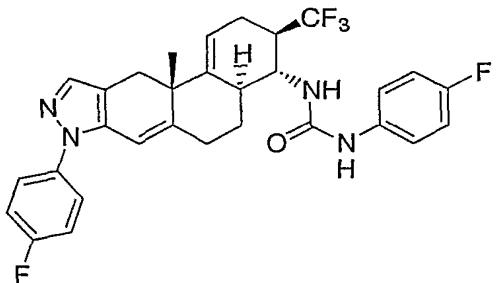
10 The title compound was prepared from (3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine from EXAMPLE 62 and 3-fluorophenylisocyanate according to the procedure described in EXAMPLE 78.

Mass spectrum (ESI) 555 (M+1).

15 <sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD): δ 1.27 (s, 3H); 1.71 (m, 1H); 2.09 (m, 1H); 2.41 (m, 4H); 2.57 (m, 2H); 2.59 (½ ABq, J=15.8 Hz, 1H); 2.88 (½ ABq, J=15.8 Hz, 1H); 3.93 (app t, J=9.6 Hz, 1H); 5.83 (br d, J=6.0 Hz, 1H); 6.24 (s, 1H); 6.69 (m, 1H); 7.02 (br d, J=8.3 Hz, 1H); 7.23 (dd, J=8.2 Hz, J=14.8 Hz, 1H); 7.28 (app t, J=8.4 Hz, 2H); 7.33 (m, 1H); 7.44 (s, 1H); 7.49 (m, 2H).

20

## EXAMPLE 80



N-[3R,4R,4aS,11aS]-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-N-(4-fluorophenyl)urea

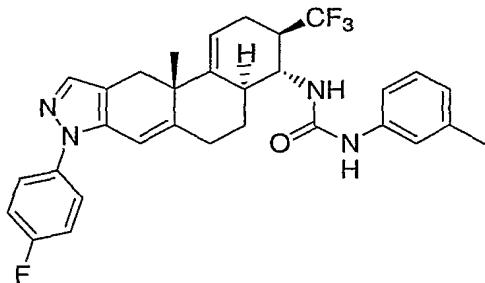
5 The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine from EXAMPLE 62 and 4-fluorophenylisocyanate according to the procedure described in EXAMPLE 78.

Mass spectrum (ESI) 555 (M+1):

10  $^1\text{H}$  NMR (500 MHz, CD<sub>3</sub>OD):  $\delta$  1.26 (s, 3H); 1.71 (m, 1H); 2.09 (m, 1H); 2.41 (m, 4H); 2.57 (m, 2H); 2.59 (½ ABq, J=15.8 Hz, 1H); 2.88 (½ ABq, J=15.8 Hz, 1H); 3.92 (app t, J=9.9 Hz, 1H); 5.82 (br d, J=5.7 Hz, 1H); 6.24 (s, 1H); 7.00 (app t, J=8.9 Hz, 2H); 7.28 (app t, J=9.0 Hz, 2H); 7.33 (m, 2H); 7.44 (s, 1H); 7.49 (m, 2H).

EXAMPLE 81

15



20 N-[3R,4R,4aS,11aS]-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-N-(3-methylphenyl)urea

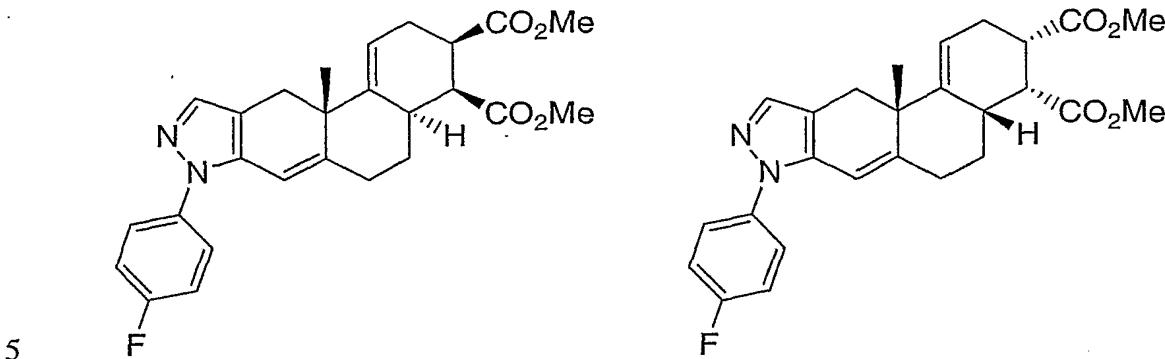
25 The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine from EXAMPLE 62 and 3-methylphenylisocyanate according to the procedure described in EXAMPLE 78.

Mass spectrum (ESI) 551 (M+1):

$^1\text{H}$  NMR (500 MHz, CD<sub>3</sub>OD):  $\delta$  1.26 (s, 3H); 1.71 (m, 1H); 2.09 (m, 1H); 2.30 (s, 3H); 2.42 (m, 4H); 2.57 (m, 2H); 2.58 (½ ABq, J=15.8 Hz, 1H); 2.88 (½ ABq, J=15.8 Hz, 1H); 3.92 (app t, J=10.0 Hz, 1H); 5.82 (br d, J=5.7 Hz, 1H); 6.24 (s, 1H); 6.82

(app t,  $J=3.2$  Hz, 1H); 7.13 (br d,  $J=4.8$  Hz, 2H); 7.19 (s, 1H); 7.28 (app t,  $J=8.7$  Hz, 2H); 7.44 (s, 1H); 7.49 (m, 2H).

## EXAMPLES 82 AND 83



Dimethyl (3R,4S,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-3,4-dicarboxylate and dimethyl (3S,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-3,4-dicarboxylate

10 To a solution of 100 mg of (4aS)-1-(4-fluorophenyl)-4a-methyl-5-vinyl-4,4a,7,8-tetrahydro-1H-benzo[f]indazole prepared as in EXAMPLE 1 Step F in 2 mL of  $\text{CH}_2\text{Cl}_2$  was added 39 mg of maleic anhydride, then 0.7 mL of a 1.0 M solution of  $\text{BCl}_3$  in  $\text{CH}_2\text{Cl}_2$ . The mixture was stirred at room temperature for 2 h, then concentrated. The residue was dissolved in 3 mL of 2:1 benzene-MeOH and excess

15  $\text{TMSCH}_2\text{N}_2$  was added. The mixture was stirred overnight, then quenched with trifluoroacetic acid and concentrated. Preparative TLC, eluting with 1:1 hexanes-EtOAc, provided 92 mg of the title compounds as approximately a 2:1 mixture. Further purification by HPLC on Chiralcel OJ, eluting with 20% ethanol-heptane, provided two clean diastereomers: 29 mg of dimethyl (3R,4S,4aR,11aS)-8-(4-

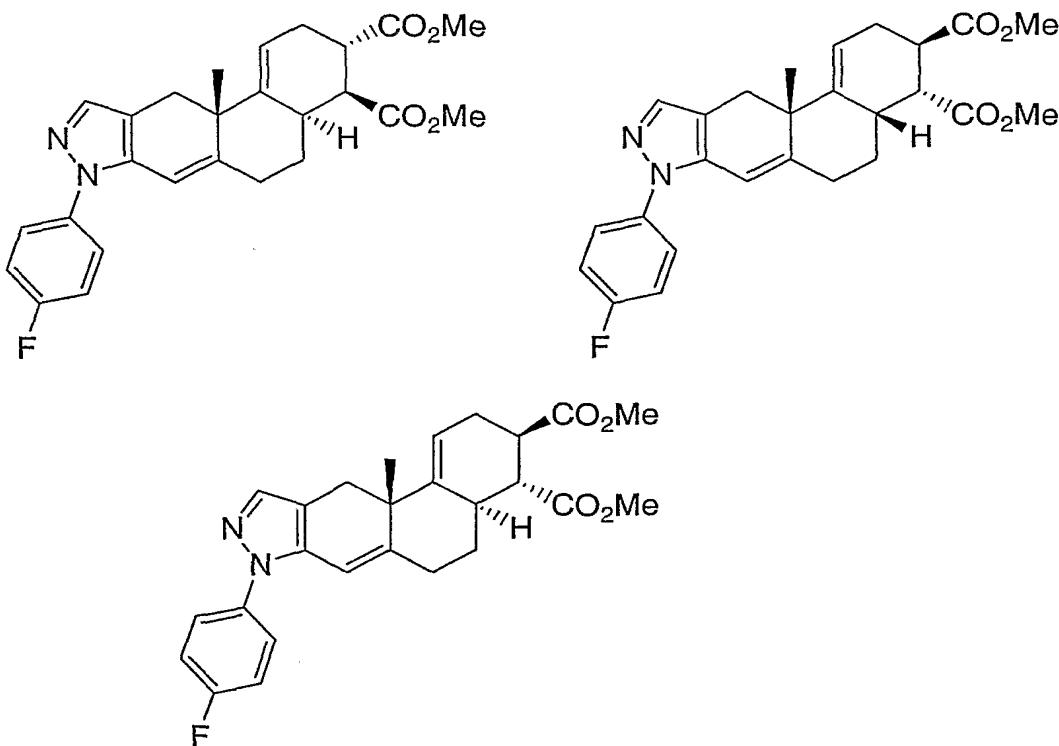
20 fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-3,4-dicarboxylate and 14.5 mg of dimethyl (3S,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-3,4-dicarboxylate. Mass spectrum (ESI) 451 ( $\text{M}+1$ ).  $^1\text{H}$  NMR (500 MHz,  $\text{CD}_3\text{CN}$ ) diagnostic peaks only:

25 EXAMPLE 82 Dimethyl (3R,4S,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-3,4-dicarboxylate:  $\delta$  3.13

(dd,  $J=4$  Hz, 6 Hz, 1H,  $H_4$ ), 2.98 (ddd,  $J=4$  Hz, 7.5 Hz, 7.5 Hz, 1H,  $H_3$ ) 2.69-2.79 (m, 2H,  $H_{4a}$ ,  $H_{11}$ ).

EXAMPLE 83 Dimethyl (3*S*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-  
 5 3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate:  $\delta$  3.22  
 (dd,  $J$ =4 Hz, 6 Hz, 1H,  $H_4$ ), 3.01 (d,  $J$ =15 Hz, 1H,  $H_{11}$ ), 2.78-2.87 (m, 2H,  $H_3$ ,  $H_{4a}$ ).

### EXAMPLES 84, 85 AND 86



10 Dimethyl (3*S*,4*S*,4*a**R*,11*a**S*)-8-(4-fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate; dimethyl (3*S*,4*S*,4*a**S*,11*a**S*)-8-(4-fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate; and dimethyl (3*R*,4*R*,4*a**R*,11*a**S*)-8-(4-fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate

15 The title compounds were prepared from (4a*S*)-1-(4-fluorophenyl)-4a-methyl-5-vinyl-4,4a,7,8-tetrahydro-1*H*-benzo[*f*]indazole EXAMPLE 1 Step F and dimethyl fumarate according to the procedure described in EXAMPLE 82.

Purification by HPLC on Chiralpak AD, eluting with 15% ethanol-heptane provided

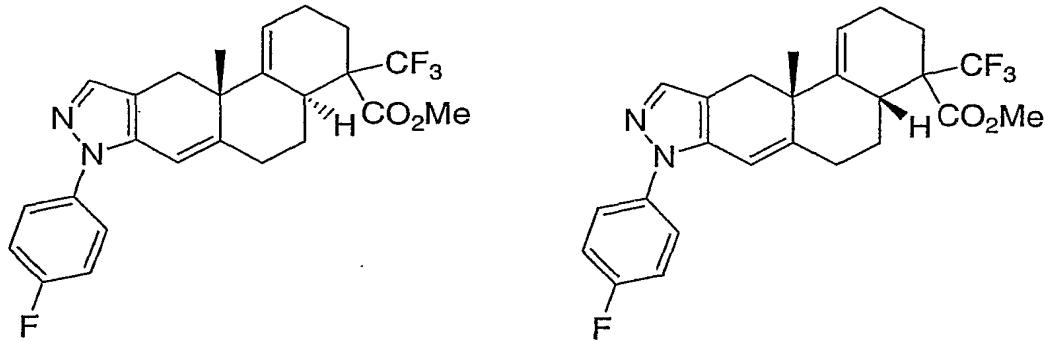
three clean diastereomers. Mass spectrum (ESI) 451 (M+1).  $^1\text{H}$  NMR (500 MHz,  $\text{C}_6\text{D}_6$ ) diagnostic peaks only:

EXAMPLE 84 Dimethyl (3*S*,4*S*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate:  $\delta$  3.19 (dd,  $J=6$  Hz, 12 Hz, 1H,  $H_4$ ), 2.95 (ddd,  $J=5.5$  Hz, 11.5 Hz, 12 Hz, 1H,  $H_3$ ) 2.84 (m, 1H,  $H_{4a}$ ).

EXAMPLE 85 Dimethyl (3*S*,4*S*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate:  $\delta$  3.00 (ddd,  $J=5$  Hz, 10.5 Hz, 11 Hz, 1H,  $H_3$ ), 2.73 (d,  $J=15$  Hz, 1H,  $H_{11}$ ), 2.66 (m, 2H,  $H_{14}$ ,  $H_{4a}$ ).

EXAMPLE 86 Dimethyl (3*R*,4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate:  $\delta$  2.95 (ddd,  $J=6$  Hz, 9.5 Hz, 10.5 Hz, 1H,  $H_3$ ), 2.78 (dd,  $J=9.5$  Hz, 11 Hz, 1H,  $H_4$ ), 2.67 (m, 1H,  $H_{11}$ ).

#### EXAMPLES 87, 88, 89, AND 90



20 Methyl (4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-4-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate and methyl (4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-4-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate

25 The title compounds were prepared from (4*aS*)-1-(4-fluorophenyl)-4*a*-methyl-5-vinyl-4,4*a*,7,8-tetrahydro-1*H*-benzo[*f*]indazole EXAMPLE 1 Step F and trifluoromethyl acrylic acid according to the procedure described in EXAMPLE 82. Purification by HPLC on Chiralcel OJ, eluting with 10% ethanol-heptane, provided

four clean diastereomers, two with 4a*S* stereochemistry and two with 4a*R* stereochemistry. Mass spectrum (ESI) 447 (M+1). <sup>1</sup>H NMR (600 MHz, C<sub>6</sub>D<sub>6</sub>) diagnostic peaks only:

EXAMPLE 87 Methyl (4a*S*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-4-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate, diastereomer 1: δ 3.09 (br t, J=9.6 Hz, 1H, H<sub>4a</sub>), 2.91 (d, J=15.6 Hz, 1H, H<sub>11</sub>), 2.25 (dd, J=5 Hz, 12 Hz, 1H, H<sub>3</sub>) 2.17, (d, J=15.6 Hz, 1H, H<sub>11</sub>), 2.09 (m, 1H, H<sub>2</sub>), 2.01 (m, 1H, H<sub>3</sub>), 1.83-1.94 (m, 2H, H<sub>2</sub>, H<sub>6</sub>).

EXAMPLE 88 Methyl (4a*S*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-4-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate, diastereomer 2: δ 3.52 (dd, J=6.5 Hz, 9.5 Hz, 1H, H<sub>4a</sub>), 3.18 (d, J=15.6 Hz, 1H, H<sub>11</sub>), 2.33-2.42 (m, 2H, H<sub>2</sub>, H<sub>3</sub>), 2.21 (d, J=15.6 Hz, 1H, H<sub>11</sub>), 2.03 (m, 1H, H<sub>6</sub>).

EXAMPLE 89 Methyl (4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-4-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate, diastereomer 1: δ 3.45 (br d, J=13.5 Hz, 1H, H<sub>4a</sub>), 2.86 (d, J=15 Hz, 1H, H<sub>11</sub>), 2.46 (m, 1H, H<sub>6</sub>), 2.39 (d, J=15 Hz, 1H, H<sub>11</sub>), 2.12-2.33 (m, 3H, H<sub>2</sub>, H<sub>3</sub>, H<sub>6</sub>).

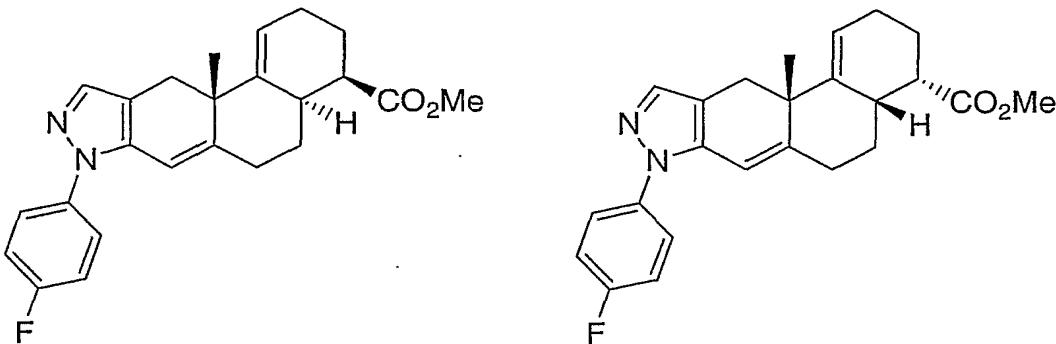
EXAMPLE 90 Methyl (4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-4-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate, diastereomer 2: δ 2.90 (br d, J=12.5 Hz, 1H, H<sub>4a</sub>), 2.86 (d, J=15.5 Hz, 1H, H<sub>11</sub>), 2.55 (d, J=15.5 Hz, 1H, H<sub>11</sub>), 2.26 (m, 1H, H<sub>6</sub>), 2.01-2.20 (m, 3H, H<sub>2</sub>, H<sub>3</sub>, H<sub>6</sub>).

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## EXAMPLES 91 AND 92



Methyl (4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylate and methyl (4S,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylate

5

The title compounds were prepared from (4aS)-1-(4-fluorophenyl)-4a-methyl-5-vinyl-4,4a,7,8-tetrahydro-1H-benzo[f]indazole from EXAMPLE 1 Step F and methyl acrylate according to the procedure described in EXAMPLE 82.

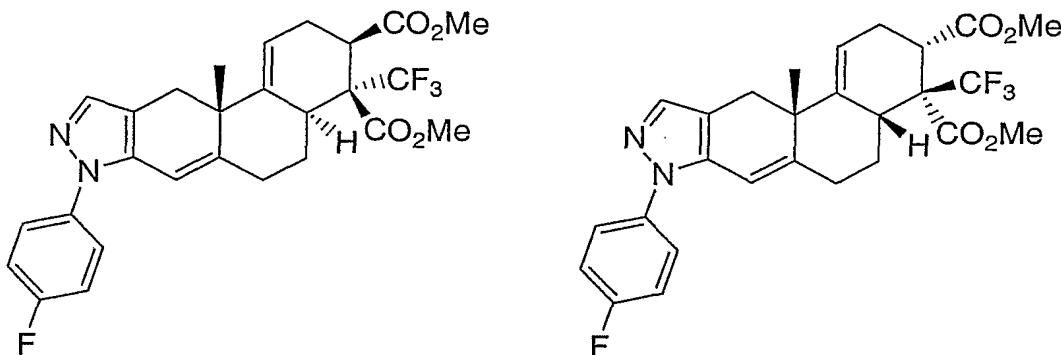
10

Purification by HPLC on Chiralcel OJ, eluting with 5% ethanol-heptane provided two clean diastereomers. Mass spectrum (ESI) 393 (M+1). <sup>1</sup>H NMR (C<sub>6</sub>D<sub>6</sub>) diagnostic peaks only:

EXAMPLE 91 Methyl (4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylate (500 MHz): δ 15 2.83 (m, 1H, H<sub>4a</sub>), 2.72 (d, J=16 Hz, 1H, H<sub>11</sub>), 2.50 (ddd, J=2.5 Hz, 5.5 Hz, 12.5 Hz, 1H, H<sub>4</sub>).

EXAMPLE 92 Methyl (4S,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylate (600 MHz): δ 20 2.91 (d, J=16 Hz, 1H, H<sub>11</sub>), 2.76 (m, 1H, H<sub>4a</sub>), 2.63 (ddd, J=3 Hz, 6 Hz, 12.5 Hz, 1H, H<sub>4</sub>).

## EXAMPLES 93 AND 94



5 Dimethyl (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(trifluoromethyl)-  
 10 3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-3,4-dicarboxylate and  
dimethyl (3S,4S,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(trifluoromethyl)-  
3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-3,4-dicarboxylate

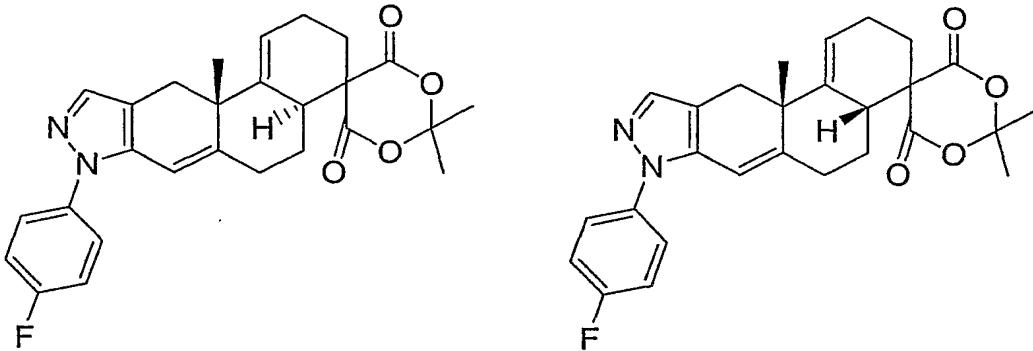
To a suspension of LiClO<sub>4</sub> (532 mg) in 0.5 mL of Et<sub>2</sub>O was added 100 mg of (4aS)-1-(4-fluorophenyl)-4a-methyl-5-vinyl-4,4a,7,8-tetrahydro-1H-10 benzo[f]indazole from EXAMPLE 1 Step F in 0.5 mL of Et<sub>2</sub>O, then 60 mg of trifluoromethylmaleic anhydride. The mixture, which gradually became homogeneous, was stirred at room temperature overnight (20h), then poured into 5 mL NaHCO<sub>3</sub> and extracted with 3 x 5 mL EtOAc. The combined organics were washed with brine, dried (Na<sub>2</sub>SO<sub>4</sub>), and concentrated. The residue was dissolved in 3 mL of 2:1 benzene-MeOH and excess TMSCH<sub>2</sub>N<sub>2</sub> was added. The mixture was stirred overnight, then quenched with trifluoroacetic acid and concentrated. Preparative TLC, eluting with 3:1 hexanes-EtOAc, provided 14 mg of dimethyl (3S,4S,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-3,4-dicarboxylate, EXAMPLE 94, and 60 mg of a 10 to 1 mixture of dimethyl (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-3,4-dicarboxylate and dimethyl (3S,4S,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-3,4-dicarboxylate. Part of 20 this mixture was used in Example 103 and 104 and the remainder was further purified by HPLC on Chiralcel OJ, eluting with 10% ethanol-heptane to give the title 25

compound of Example 93. Mass spectrum (ESI) 519 (M+1).  $^1\text{H}$  NMR (500 MHz) diagnostic peaks only:

EXAMPLE 93 Dimethyl (3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-4-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate ( $\text{CDCl}_3$ ):  $\delta$  3.08 (dd,  $J=6$  Hz, 9 Hz, 1H,  $H_3$ ), 2.93 (br t,  $J=9.5$  Hz, 1H,  $H_{4a}$ ).

EXAMPLE 94 Dimethyl (3*S*,4*S*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-4-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate ( $\text{C}_6\text{D}_6$ ):  $\delta$  2.99 (dd,  $J=6.5$  Hz, 11.5 Hz, 1H,  $H_3$ ), 2.81 (br d,  $J=11.5$  Hz, 1H,  $H_{4a}$ ).

#### EXAMPLES 95 AND 96



15 (4a*R*,11*aS*)-8-(4-Fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-(2,2-dimethyl-1,3-dioxane-4,6-dione) and (4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-(2,2-dimethyl-1,3-dioxane-4,6-dione)

To a solution of 100 mg of (4*aS*)-1-(4-fluorophenyl)-4*a*-methyl-5-vinyl-4,4*a*,7,8-tetrahydro-1*H*-benzo[*f*]indazole from EXAMPLE 1 Step F, 47 mg of 2,2-dimethyl-1,3-dioxane-4,6-dione, and 4 mg of *L*-proline in 1 mL of  $\text{CH}_3\text{CN}$  was added 32  $\mu\text{L}$  of a 37% aqueous solution of formaldehyde. The mixture was stirred at room temperature for 1 h; then an additional 5 mg of 2,2-dimethyl-1,3-dioxane-4,6-dione and 5  $\mu\text{L}$  of formaldehyde were added. After 5 min, a white precipitate formed and the mixture was quenched by addition of ice, then filtered, washing solids with cold water. The solid precipitate was dried under vacuum to yield 129 mg of a 10:1

mixture of the title compounds. Recrystallization (2 crops) from t-butyl methyl ether provided 93 mg of (4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-(2,2-dimethyl-1,3-dioxane-4,6-dione).

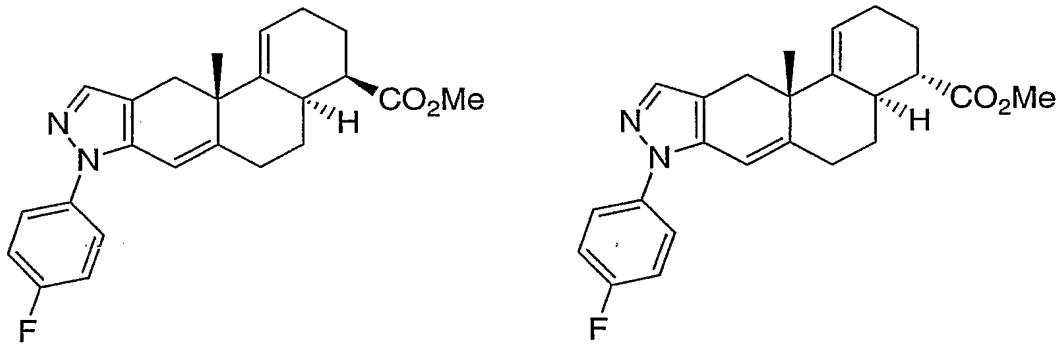
Preparative TLC of the filtrate, eluting with 1:1 hexanes-EtOAc, provided an

5 additional 18 mg of the major diastereomer, and 10 mg of (4a*S*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-(2,2-dimethyl-1,3-dioxane-4,6-dione). Mass spectrum (ESI) 463 (M+1). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) diagnostic peaks only:

EXAMPLE 95 (4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-(2,2-dimethyl-1,3-dioxane-4,6-dione): δ 5.86 (m, 1H, H<sub>4a</sub>).

EXAMPLE 96(4a*S*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-(2,2-dimethyl-1,3-dioxane-4,6-dione): δ 3.33 (br d, J=12.6 Hz, 1H, H<sub>4a</sub>).

#### EXAMPLES 97 AND 98



Methyl (4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate and methyl (4*S*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate

To a solution of 890 mg of (4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-(2,2-dimethyl-1,3-dioxane-4,6-dione from EXAMPLE 95 in 10 mL of DMSO was added 200 μL of water, then 81 mg of LiOH. The mixture was heated to 120C for 4 h, then cooled, poured into 20 mL of 1N HCl and extracted with 3 X 20 mL of Et<sub>2</sub>O. The combined

organics were washed with 10 mL of brine, dried ( $\text{Na}_2\text{SO}_4$ ), and concentrated. The residue was dissolved in 5 mL of benzene and 0.5 mL of MeOH and treated with 1.5 mL of 2.0 M  $\text{TMSCl}_2\text{N}_2$ , then quenched with trifluoroacetic acid and concentrated. Flash chromatography (Biotage Horizon system, 40S cartridge) with a gradient of 2% EtOAc in hexanes to 100% EtOAc provided 650 mg of the title compounds as a 1.6:1 mixture of diastereomers. Further purification of a 140 mg aliquot of the mixture by HPLC on Chiralpak AD, eluting with 50% isopropanol-heptane, provided 76 mg of methyl (*4R,4aR,11aS*)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate and 46 mg of methyl (*4S,4aR,11aS*)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate. Mass spectrum (ESI) 393 ( $\text{M}+1$ ).  $^1\text{H}$  NMR (500 MHz,  $\text{C}_6\text{D}_6$ ) diagnostic peaks only:

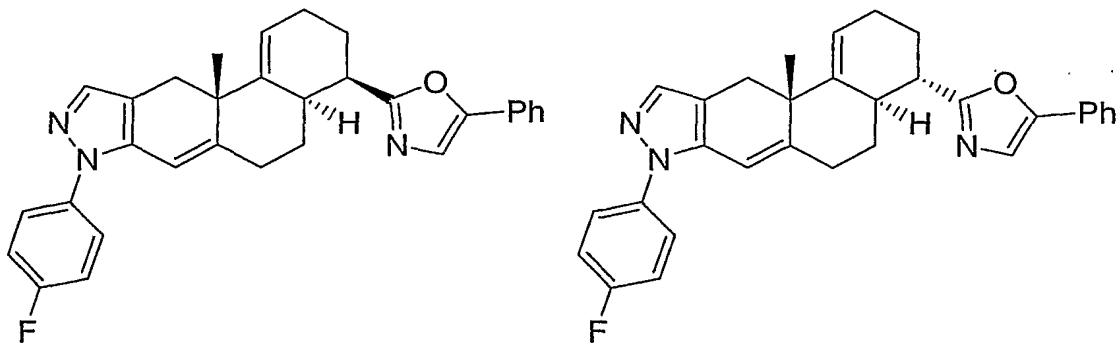
EXAMPLE 97 Methyl (*4R,4aR,11aS*)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate: see

EXAMPLE 91

EXAMPLE 98 Methyl (*4S,4aR,11aS*)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate:  $\delta$  3.08 (d,  $J=16$  Hz, 1H,  $H_{11}$ ), 2.91 (m, 1H,  $H_{4a}$ ), 2.31 (m, 1H,  $H_4$ ).

20

## EXAMPLES 99 AND 100



25

(4R,4aR,11aS)-8-(4-Fluorophenyl)-11a-methyl-4-(5-phenyl-1,3-oxazol-2-yl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole and (4S,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(5-phenyl-1,3-oxazol-2-yl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole

Step A: (4aR,11aS)-8-(4-Fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylic acid

To a solution of 25 mg of a ca. 1:1 mixture of methyl (4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylate and methyl (4S,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylate (EXAMPLEs 97 and 98) in 1.5 mL of 1:1:1 THF-MeOH-H<sub>2</sub>O was added LiOH. The mixture was stirred overnight (18 h) at 45° C, then cooled, diluted with 10 mL of 1 N HCl, and extracted with 3 X 10 mL of EtOAc. The combined organics were dried (Na<sub>2</sub>SO<sub>4</sub>) and concentrated to yield 21 mg of the title compound as a ca. 1:1 mixture of diastereomers. Mass spectrum (ESI) 379 (M+1).

Step B: (4aR,11aS)-8-(4-Fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4- N-(2-oxo-2-phenylethyl)carboxamide

To a 0° C solution of 45 mg of (4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylic acid (a ca. 1:1 mixture of diastereomers, EXAMPLE 99, Step A) in 1 mL of CH<sub>2</sub>Cl<sub>2</sub> was added oxalyl chloride (90 μL of a 2.0 M solution in CH<sub>2</sub>Cl<sub>2</sub>), then DMF (5 μL). The mixture was stirred at 0° C until gas evolution ceased; then the bath was removed and stirring was continued for 30 min, at which point LC/MS analysis showed no starting material. The mixture was concentrated, then co-concentrated twice with 10 mL toluene, then redissolved in 1 mL of CH<sub>2</sub>Cl<sub>2</sub>. 2-Aminoacetophenone (22 mg) and Et<sub>3</sub>N (36 μL) were added and the mixture was stirred overnight at room temperature. The mixture was diluted with 10 mL of 10% aq NH<sub>4</sub>OH, and extracted with 3 X 10 mL of CH<sub>2</sub>Cl<sub>2</sub>. The combined organics were washed with 10 mL of brine, dried (Na<sub>2</sub>SO<sub>4</sub>) and concentrated. Preparative TLC, eluting with 1:1 hexanes-EtOAc provided 40 mg of the title compound as a ca. 1:1 mixture of diastereomers. Mass spectrum (ESI) 496 (M+1).

Step C: (4R,4aR,11aS)-8-(4-fluorophenyl)-11a-Methyl-4-(5-phenyl-1,3-oxazol-2-yl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole and (4S,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-4-(5-phenyl-1,3-oxazol-2-yl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole

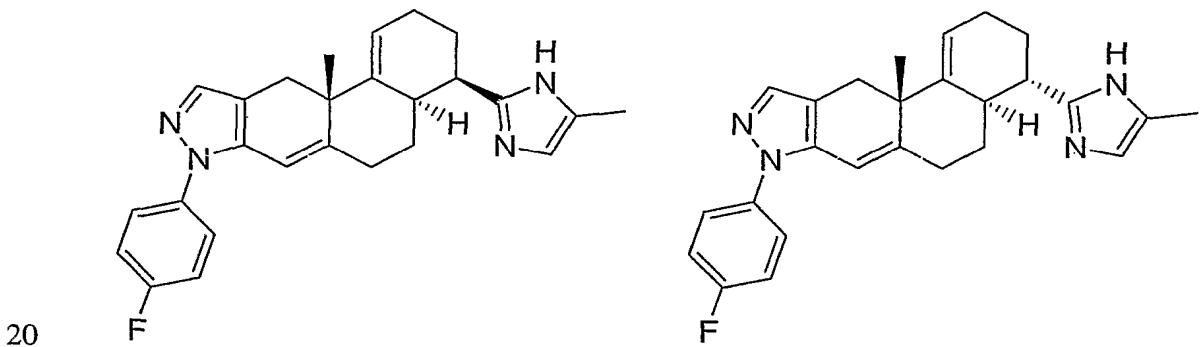
A solution of 38 mg of (4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4- N-(2-oxo-2-

phenylethyl)carboxamide (a ca. 1:1 mixture of diastereomers, EXAMPLE 99, Step B) in 1 mL of phosphorus oxychloride was heated to reflux and stirred at this temperature for 30 min, then quenched by careful addition of ice. The mixture was basified with conc. NH<sub>4</sub>OH (exothermic), diluted with 5 mL of H<sub>2</sub>O and extracted with 3 X 10 mL of CH<sub>2</sub>Cl<sub>2</sub>. The combined organics were washed with 10 mL of brine, dried (Na<sub>2</sub>SO<sub>4</sub>) and concentrated. Preparative TLC, eluting with 2:1 hexanes-EtOAc provided 10 mg of each of the title compounds. Mass spectrum (ESI) 496 (M+1). <sup>1</sup>H NMR (600 MHz, C<sub>6</sub>D<sub>6</sub>) diagnostic peaks only:

EXAMPLE 99 (4*R*,4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-4-(5-phenyl-1,3-oxazol-2-yl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole: δ 3.06 (m, H<sub>4</sub>), 3.00 (m, 1H, H<sub>4a</sub>), 2.78 (d, J=16 Hz, 1 H, H<sub>11</sub>), 2.19 (d, J=16 Hz, 1 H, H<sub>11</sub>), 2.12 (m, 1 H, H<sub>3</sub>), 1.86-2.06 (m, 4 H, H<sub>2</sub>, H<sub>2</sub>, H<sub>3</sub>, H<sub>6</sub>).

EXAMPLE 100 (4*S*,4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-4-(5-phenyl-1,3-oxazol-2-yl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole: δ 3.23 (d, J=16 Hz, 1 H, H<sub>11</sub>), 3.15 (m, H<sub>4a</sub>), 2.85 (m, 1H, H<sub>4</sub>), 2.30(d, J=16 Hz, 1 H, H<sub>11</sub>), 2.12 (m, 1 H, H<sub>3</sub>), 1.86-2.16 (m, 5 H, H<sub>2</sub>, H<sub>2</sub>, H<sub>3</sub>, H<sub>6</sub>, H<sub>6</sub>).

#### EXAMPLES 101 AND 102



(4*R*,4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-Methyl-4-(5-methyl-1*H*-imidazol-2-yl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole and (4*S*,4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-4-(5-methyl-1*H*-imidazol-2-yl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole

25 Step A: (4a*R*,11a*S*)-8-(4-Fluorophenyl)-11a-methyl-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carbaldehyde

To a 0°C solution of 105 mg of a ca. 1:1 mixture of methyl (4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate and methyl (4*S*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate (EXAMPLES 97 and 98) in 3 mL of THF was added 0.3 mL of a 1.0 M solution of LiAlH<sub>4</sub> in THF dropwise. The mixture was stirred 15 min at 0°C; then the bath was removed and the mixture was stirred 30 min while warming to room temperature, at which point TLC showed no starting material. To the mixture was added 11 µL of H<sub>2</sub>O, then 11 µL of 15% aq NaOH, then 33 µL of H<sub>2</sub>O. The mixture was stirred 30 min, then filtered and concentrated. The residue was dissolved in 1 mL of CH<sub>2</sub>Cl<sub>2</sub>. To 0.31 mL of a 2.0 M solution of oxalyl chloride in 2 mL of CH<sub>2</sub>Cl<sub>2</sub> at -78°C was added 36 µL of DMSO. The mixture was stirred 5 min at -78°C; then the solution of alcohol in 1 mL CH<sub>2</sub>Cl<sub>2</sub> was added dropwise and stirring was continued for 15 min. Et<sub>3</sub>N (0.14 mL) was added and the mixture was stirred 10 min at -78°C, then allowed to warm to room temperature. The mixture was poured into 10 mL of saturated NaHCO<sub>3</sub> and extracted with 15 mL of EtOAc. The organic extract was washed with 10 mL each of 1 N NaHSO<sub>4</sub>, saturated NaHCO<sub>3</sub>, and brine, then dried (Na<sub>2</sub>SO<sub>4</sub>) and concentrated to yield 67 mg of the title compound as a ca. 1:1 mixture of diastereomers. Mass spectrum (ESI) 363 (M+1).

Step B: (4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-Methyl-4-(5-methyl-1*H*-imidazol-2-yl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole and (4*S*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-4-(5-methyl-1*H*-imidazol-2-yl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole

To a 0°C solution of 87 mg of (4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carbaldehyde (a ca. 1:1 mixture of diastereomers), from Step A in 3 mL of MeOH was added ammonium acetate (185 mg) and methyl glyoxal (0.13 mL of a 40% aqueous solution). The mixture was heated to reflux and stirred at this temperature overnight. The mixture was cooled and concentrated, then dissolved in minimal CH<sub>2</sub>Cl<sub>2</sub>-MeOH and purified by preparative TLC, eluting with 9:1 CH<sub>2</sub>Cl<sub>2</sub>-MeOH to provide 14 mg of (4*R*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-4-(5-methyl-1*H*-imidazol-2-yl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole and 12 mg of (4*S*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-4-(5-methyl-1*H*-imidazol-2-yl)-

3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole. Mass spectrum (ESI) 415 (M+1). <sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>OD) diagnostic peaks only:

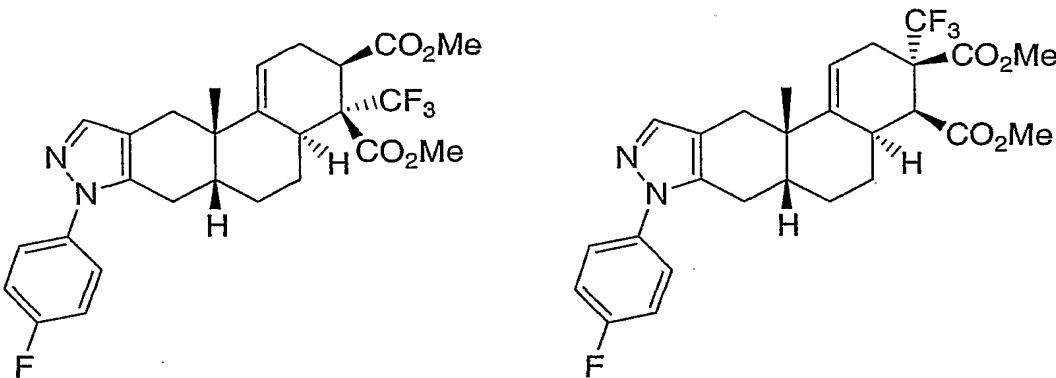
EXAMPLE 101 (4*R*,4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-4-(5-methyl-1*H*-imidazol-2-yl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole: δ 3.13 (m,

5 1H, H<sub>4</sub>), 2.97 (d, J=15.5 Hz, 1 H, H<sub>11</sub>), 2.80 (m, 1H, H<sub>4a</sub>), 2.43 (d, J=15.5 Hz, 1 H, H<sub>11</sub>).

EXAMPLE 102 (4*S*,4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-4-(5-methyl-1*H*-imidazol-2-yl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole: δ 2.92 (d,

10 J=16 Hz, 1 H, H<sub>11</sub>), 2.70-2.80 (m, 2H, H<sub>4a</sub>, H<sub>4</sub>), 2.51 (d, J=16 Hz, 1 H, H<sub>11</sub>).

#### EXAMPLES 103 AND 104



15 Dimethyl (3*R*,4*R*,4a*S*,6*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-4-(trifluoromethyl)-3,4,4a,5,6,6*a*,7,8,11,11*a*-decahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate and dimethyl (3*S*,4*S*,4*aR*,6*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4a,5,6,6*a*,7,8,11,11*a*-decahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate

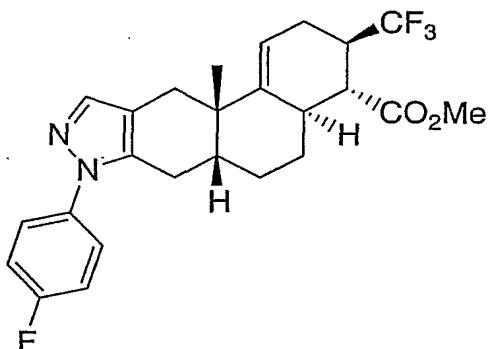
20 To a solution of 20 mg of a ca. 10:1 mix of dimethyl (3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-4-(trifluoromethyl)-3,4,4a,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate and dimethyl (3*S*,4*S*,4*aR*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate (see EXAMPLE 93) in 1 mL of EtOAc was added 10 mg of PtO<sub>2</sub> (Adam's catalyst). The mixture was flushed with N<sub>2</sub>, then flushed with H<sub>2</sub> and stirred 3 h under an H<sub>2</sub> balloon, at which point LC/MS analysis showed no starting material. The mixture was filtered through Celite, washing liberally with MeOH, then concentrated.

Preparative TLC, eluting with 3:1 hexanes-EtOAc, provided 15.9 mg of dimethyl (3*R*,4*R*,4a*S*,6a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-4-(trifluoromethyl)-3,4,4a,5,6,6a,7,8,11,11a-decahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate and 1.2 mg of dimethyl (3*S*,4*S*,4a*R*,6a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,6a,7,8,11,11a-decahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate. Mass spectrum (ESI) 521 (M+1). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) diagnostic peaks only:

EXAMPLE 103 Dimethyl (3*R*,4*R*,4a*S*,6a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-4-(trifluoromethyl)-3,4,4a,5,6,6a,7,8,11,11a-decahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate: 3.04 (dd, J=6 Hz, 17 Hz, 1H, H<sub>7</sub>), 2.78-2.95 (m, 4H, H<sub>2</sub>, H<sub>3</sub>, H<sub>4a</sub>, H<sub>11</sub>), 2.34-2.46 (m, 2H, H<sub>7</sub>, H<sub>2</sub>), 1.68 (m, 1H, H<sub>6a</sub>).

EXAMPLE 104 Dimethyl (3*S*,4*S*,4a*R*,6a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,6a,7,8,11,11a-decahydro-2*H*-naphtho[1,2-*f*]indazole-3,4-dicarboxylate: δ 3.59 (d, J=6.5 Hz, 1H, H<sub>4</sub>), 3.27 (br d, J=19 Hz, 1H, H<sub>2</sub>), 3.06 (dd, J=6.5 Hz, 17 Hz, 1H, H<sub>7</sub>), 2.75-2.85 (m, 2H, H<sub>4a</sub>, H<sub>11</sub>), 2.60 (dd, J=5.5 Hz, 19.5 Hz, 1H, H<sub>2</sub>), 2.41 (d, J= 16.5 Hz, 1H, H<sub>7</sub>), 1.69 (m, 1H, H<sub>6a</sub>).

#### EXAMPLE 105



20

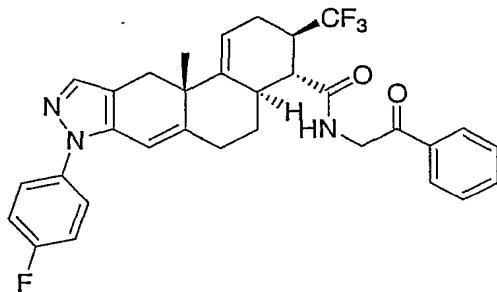
Methyl (3*R*,4*R*,4a*R*,6a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,6a,7,8,11,11a-decahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate

The title compound was prepared from methyl (3*R*,4*R*,4a*R*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazole-4-carboxylate (EXAMPLE 1) according to the procedure described in EXAMPLE 103. Final purification by HPLC on Chiralpak AD, eluting

with 10% ethanol-heptane provided the title compound. Mass spectrum (ESI) 477 (M+1). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) diagnostic peaks only: δ 3.04 (dd, J=6 Hz, 17 Hz, 1H, H<sub>7</sub>), 2.93 (d, J=16 Hz, 1H, H<sub>11</sub>), 2.73 (m, 1H, H<sub>4a</sub>), 2.57 (m, 1H, H<sub>3</sub>), 2.36-2.46 (m, 2H, H<sub>7</sub>, H<sub>2</sub>), 2.33 (dd, J=10.5 Hz, 11.5 Hz, 1H, H<sub>4</sub>), 1.66 (m, 1H, H<sub>6a</sub>).

5

## EXAMPLE 109



10 (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-(2-oxo-2-phenylethyl)carboxamide

15 A solution of (3R,4R,4aR,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazole-4-carboxylic acid (40.8 mg, 0.091 mmol) in CH<sub>2</sub>Cl<sub>2</sub> (1.0 mL) was cooled down to 0 °C, and to this was added oxalyl chloride (70 μL, 2.0 M, 0.137 mmol) followed by 1 drop of DMF via pipet. The reaction mixture was stirred for 2h while slowly warming up to room temperature. The solvent was removed under reduced pressure, and the residue was co-evaporated two times with toluene. After drying under high vacuum, 20 the acid chloride was dissolved in CH<sub>2</sub>Cl<sub>2</sub> (1.0 mL), and to this was added 2-aminoacetophenone hydrochloride (18 mg, 0.1 mmol) followed by Et<sub>3</sub>N (28 μL, 0.2 mmol). The reaction mixture was stirred for 2h, then 10% aqueous NH<sub>4</sub>OH was added. The aqueous layer was extracted with CH<sub>2</sub>Cl<sub>2</sub>, and combined extracts were washed with brine and dried over Na<sub>2</sub>SO<sub>4</sub>. The crude material was purified by 25 preparative TLC eluting with 1:2 acetone:hexane to obtain 42 mg of the title compound.

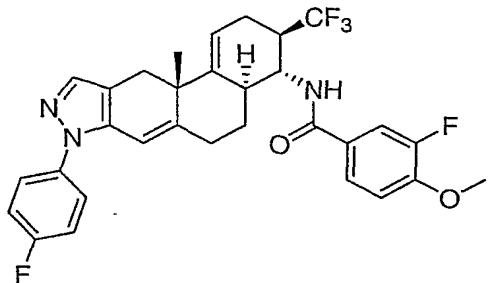
<sup>1</sup>H NMR (CDCl<sub>3</sub>, 500MHz): δ 7.97 (d, J = 7.6 Hz, 2H); 7.62-7.39 (m, 6H); 7.14 (t, J = 8.6 Hz, 2H); 6.82 (1 NH); 6.16 (s, 1H); 5.73 (d, J = 6.0 Hz, 1H); 4.91 (dd, J = 5, 19.9 Hz, 1H); 4.68 (dd, J = 3.5, 19.9 Hz, 1H); 2.86 (m, 1H); 2.87 (d, J =

15.8 Hz, 1H); 2.71 (m, 1H); 2.5 (d,  $J$  = 15.8 Hz, 1H); 2.44-2.21 (m, 5H); 2.01 (m, 1H); 1.5 (m, 1H); 1.22 (s, 3H). Mass spectrum (ESI): 564.2 (M+1).

The following examples were synthesized by procedures analogous to  
5 that described in EXAMPLE 109:

Compound	Molecular Structure	LCMS (M+1) <sup>+</sup>
110		582
111		598
112		594
113		578

## EXAMPLE 118



5

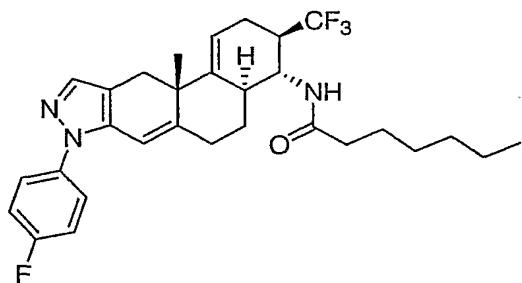
3-fluoro-N-[(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-4-methoxybenzamide

The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 63.

Mass spectrum (ESI) 570 (M+1).

15

## EXAMPLE 119



20 N-[(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]heptanamide

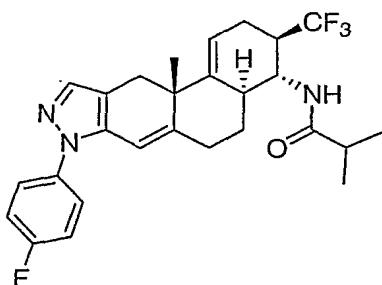
The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-

4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 63.

Mass spectrum (ESI) 530 (M+1).

5

## EXAMPLE 120

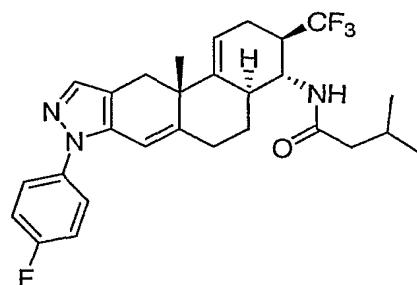


10 N-[(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-2-methylpropanamide

The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 63.

15 Mass spectrum (ESI) 488 (M+1).

## EXAMPLE 121



20

N-[(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-3-methylbutanamide

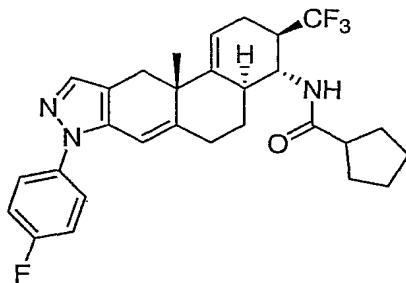
The title compound was prepared from (3*R*,4*R*,4a*S*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 63.

5 The product was purified by flash column chromatography on silica gel eluting with 1%-100% methanol in dichloromethane.

Mass spectrum (ESI) 502 (M+1).

#### EXAMPLE 122

10



N-[3R,4R,4aS,11aS]-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]cyclopentanecarboxamide

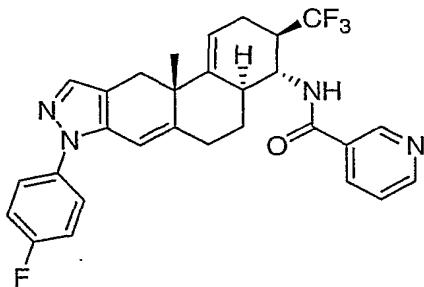
The title compound was prepared from (3*R*,4*R*,4a*S*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 63.

20

The product was purified by preparative thin-layer chromatography, eluting with 97.5:2.5 dichloromethane-methanol.

Mass spectrum (ESI) 514 (M+1).

## EXAMPLE 123



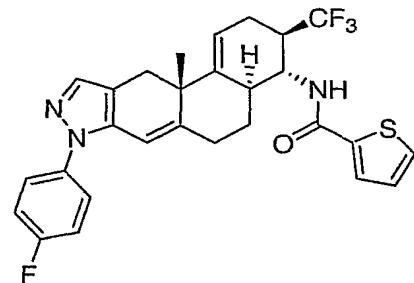
5 *N*-[(3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]nicotinamide

The title compound was prepared from (3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 63.

Mass spectrum (ESI) 523 (M+1).

## EXAMPLE 124

15



*N*-[(3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]thiophene-2-carboxamide

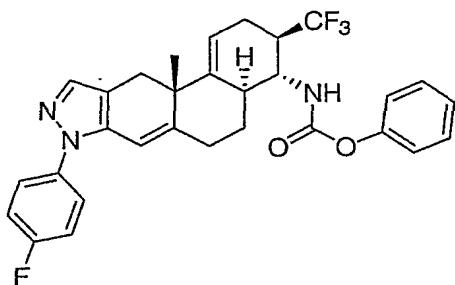
The title compound was prepared from (3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-

4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 63.

Mass spectrum (ESI) 528 (M+1).

5

## EXAMPLE 125



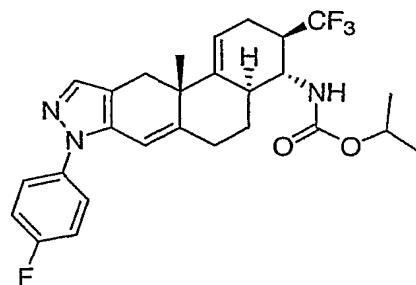
10 Phenyl [(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]carbamate

15 The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 63.

Mass spectrum (ESI) 538 (M+1).

## EXAMPLE 126

20



Isopropyl [(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]carbamate

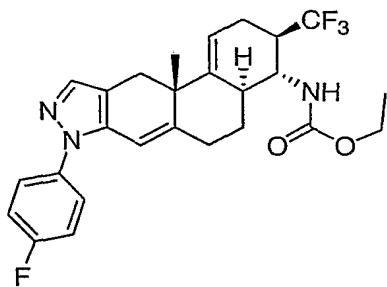
The title compound was prepared from (3*R*,4*R*,4a*S*,11a*S*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 63.

5 The product was purified by preparative thin-layer chromatography, eluting with 97.5:2.5 dichloromethane-methanol.

Mass spectrum (ESI) 504 (M+1).

#### EXAMPLE 127

10



Ethyl [(3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]carbamate

15

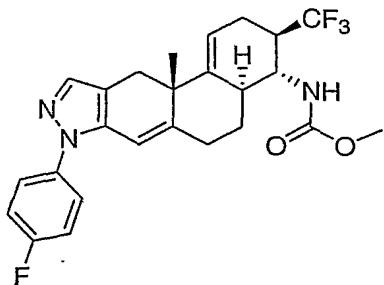
The title compound was prepared from (3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 63.

20

The product was purified by preparative thin-layer chromatography, eluting with 97.5:2.5 dichloromethane-methanol.

Mass spectrum (ESI) 490 (M+1).

## EXAMPLE 128



5    methyl [(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]carbamate

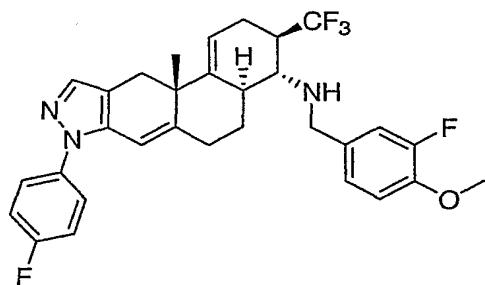
The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 63.

The product was purified by preparative thin-layer chromatography, eluting with 75:25 dichloromethane-methanol.

Mass spectrum (ESI) 476 (M+1).

15

## EXAMPLE 129



20

(3R,4R,4aS,11aS)-N-(3-fluoro-4-methoxybenzyl)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine

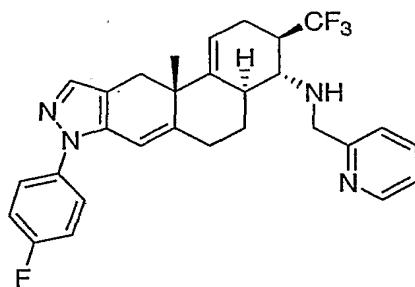
The title compound was prepared from (3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 70.

5 The product was purified by preparative thin-layer chromatography, eluting with 97.5:2.5 dichloromethane-methanol.

Mass spectrum (ESI) 556 (M+1).

#### EXAMPLE 130

10



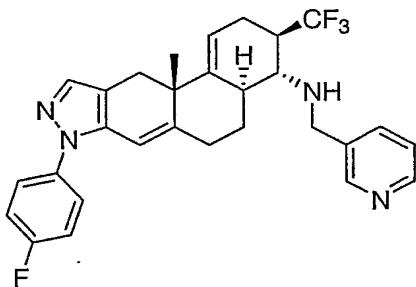
15 (3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-*N*-(pyridin-2-ylmethyl)-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine

The title compound was prepared from (3*R*,4*R*,4*aS*,11*aS*)-8-(4-fluorophenyl)-11*a*-methyl-3-(trifluoromethyl)-3,4,4*a*,5,6,8,11,11*a*-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 70.

20 The product was purified by preparative thin-layer chromatography, eluting with 97.5:2.5 dichloromethane-methanol.

Mass spectrum (ESI) 509 (M+1).

## EXAMPLE 131



5 (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-N-(pyridin-3-ylmethyl)-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine

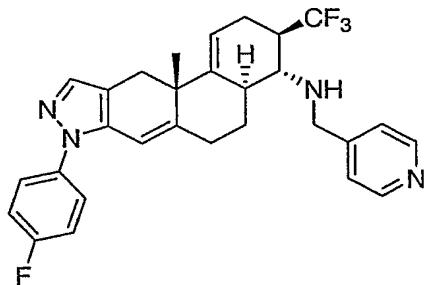
The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 70.

The product was purified by preparative thin-layer chromatography, eluting with 97.5:2.5 dichloromethane-methanol.

Mass spectrum (ESI) 509 (M+1).

15

## EXAMPLE 132



20 (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-N-(pyridin-4-ylmethyl)-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine

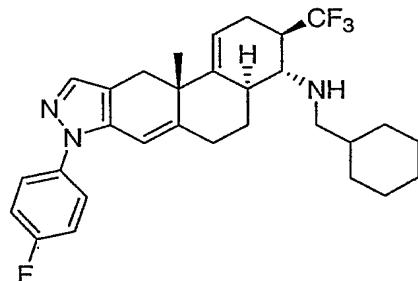
The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-

4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 70.

The product was purified by preparative thin-layer chromatography, eluting with 95:5 dichloromethane-methanol.

5 Mass spectrum (ESI) 509 (M+1).

#### EXAMPLE 133



10

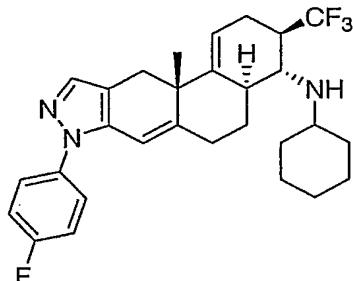
(3R,4R,4aS,11aS)-N-(cyclohexylmethyl)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine

15 The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 70.

The product was purified by preparative thin-layer chromatography, eluting with 97.5:2.5 dichloromethane-methanol.

20 Mass spectrum (ESI) 514 (M+1).

#### EXAMPLE 134



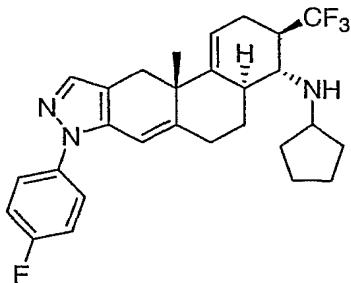
(3R,4R,4aS,11aS)-N-cyclohexyl-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine

5 The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 70.

10 The product was purified by preparative thin-layer chromatography, eluting with 97.5:2.5 dichloromethane-methanol.

15 Mass spectrum (ESI) 500 (M+1).

EXAMPLE 135



15

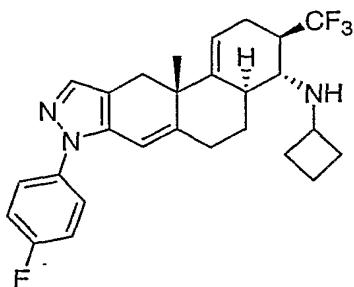
(3R,4R,4aS,11aS)-N-cyclopentyl-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine

20 The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 70.

25 The product was purified by preparative thin-layer chromatography, eluting with 97.5:2.5 dichloromethane-methanol.

Mass spectrum (ESI) 486 (M+1).

## EXAMPLE 136



5 (3R,4R,4aS,11aS)-N-cyclobutyl-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine

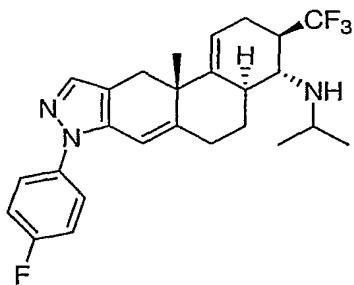
The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 70.

The product was purified by preparative thin-layer chromatography, eluting with 97.5:2.5 dichloromethane-methanol.

Mass spectrum (ESI) 472 (M+1).

15

## EXAMPLE 137



20 (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-N-isopropyl-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine

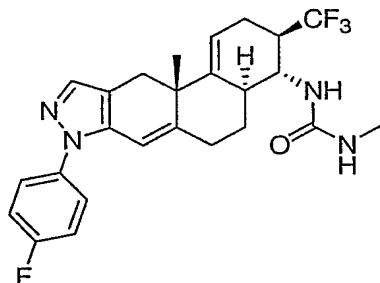
The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-

4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 70.

The product was purified by preparative thin-layer chromatography, eluting with 97.5:2.5 dichloromethane-methanol.

5 Mass spectrum (ESI) 460 (M+1).

#### EXAMPLE 138



10

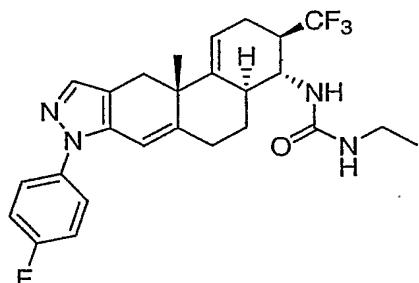
N-[(3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-yl]-N'-methylurea

The title compound was prepared from (3R,4R,4aS,11aS)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2H-naphtho[1,2-f]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 78.

Mass spectrum (ESI) 475 (M+1).

20

#### EXAMPLE 139



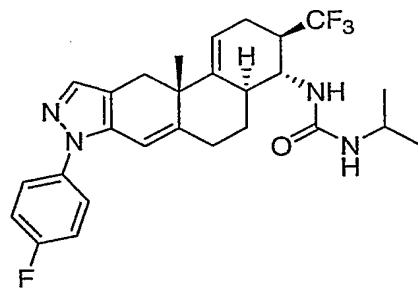
*N*-ethyl-*N*'-[*(3R,4R,4aS,11aS)*-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]urea

The title compound was prepared from (*3R,4R,4aS,11aS*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 78.

Mass spectrum (ESI) 489 (M+1):

10

## EXAMPLE 140



*N*-[*(3R,4R,4aS,11aS)*-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-yl]-*N*'-isopropylurea

The title compound was prepared from (*3R,4R,4aS,11aS*)-8-(4-fluorophenyl)-11a-methyl-3-(trifluoromethyl)-3,4,4a,5,6,8,11,11a-octahydro-2*H*-naphtho[1,2-*f*]indazol-4-amine (EXAMPLE 62) by a procedure analogous to that described in EXAMPLE 78.

Mass spectrum (ESI) 503 (M+1).

## BIOLOGICAL ASSAYS

The activity of the compounds of the present invention as modulators of the glucocorticoid receptor can be evaluated using the following assays:

5

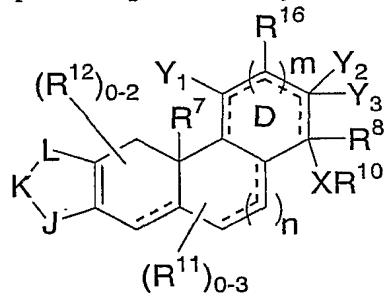
Ligand Binding Assays

For the hGRI ligand binding assay, cytosols were prepared from recombinant baculovirus expressed receptors. Frozen cell pellets were dounce homogenized in ice cold KPO<sub>4</sub> buffer (10mM KPO<sub>4</sub>, 20mM sodium molybdate, 10 1mM EDTA, 5mM DTT and complete protease inhibitor tablets from Boehringer Mannheim) with a "B" plunger. The homogenates were centrifuged at 35,000 x g for 1 h at 4°C in a JA-20 rotor. The IC<sub>50</sub>s were determined by incubating the cytosols at a final concentration of 2.5nM [1,2,4,6,7-<sup>3</sup>H] Dexamethasone in the presence of increasing concentrations (10-11 to 10-6) of cold dexamethasone or the ligands at 4°C 15 for 24 h. Bound and free were separated by a gel filtration assay, (Geissler et al., personal communication). Half of the reaction was added to a gel filtration plate (MILLIPORE) containing sephadex G-25 beads that was previously equilibrated with KPO<sub>4</sub> buffer containing 1mg/ml BSA and centrifuged at 1000 x g for 5 min.. The reaction plate was centrifuged at 1000 x g for 5 min. and the reactions were collected 20 in a second 96-well plate and scintillation cocktail was added and counted in (Wallac) double coincidence beta counter. The IC<sub>50</sub>s were calculated using a 4-parameter fit program.

The IC<sub>50</sub> of representative compounds of the invention are in the range 25 of 1 nM to 3.0 μM.

## WHAT IS CLAIMED IS:

1. A compound represented by Formula I



5

I

or a pharmaceutically acceptable salt or hydrate thereof, wherein:

n and m are each independently 0, 1 or 2;

10

J is selected from NR<sup>1</sup> or C(R<sup>1</sup>)(R<sup>2</sup>);K is selected from NR<sup>3</sup> or C(R<sup>3</sup>)(R<sup>4</sup>);

15

L is selected from NR<sup>5</sup> or C(R<sup>5</sup>)(R<sup>6</sup>);X is a bond, -C(O), -N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-, -C(O)-N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-S(O)<sub>k</sub>-, -N(R<sup>14</sup>)-C(O)-NH- or -S(O)<sub>k</sub>-N(R<sup>14</sup>);

20

k is 0, 1 or 2;

R<sup>1</sup> and R<sup>10</sup> are each independently selected from the group consisting of:

25

- (1) C<sub>1</sub>-6alkyl,
- (2) C<sub>2</sub>-6alkenyl,
- (3) C<sub>2</sub>-6akynyl,
- (4) C<sub>3</sub>-6cycloalkyl,
- (5) C<sub>1</sub>-6alkoxy,
- (6) C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,

- (7) aryl,
- (8) aryl C<sub>1-6</sub>alkyl,
- (9) HET,
- (10) -C<sub>1-6</sub>alkyl-HET,
- 5 (11) aryloxy,
- (12) aroyloxy,
- (13) aryl C<sub>2-6</sub>alkenyl,
- (14) aryl C<sub>2-6</sub>alkynyl,
- (15) hydrogen,
- 10 (16) hydroxyl and
- (17) cyano

wherein items (1) to (6) above and the alkyl portions of items (8) and (10) above and the alkenyl portion of item (13) above and the alkynyl portion of item (14) above are 15 optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, oxo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, C<sub>3-6</sub>cycloalkyl and C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2, and

20 wherein items (7), (9), (11) and (12) above and aryl portion of items (8), (13) and (14) above and the HET portion of item (10) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of:

- (a) halo,
- (b) OR<sup>13</sup>,
- 25 (c) N(R<sup>14</sup>)<sub>2</sub>,
- (d) C<sub>1-6</sub>alkyl,
- (e) C<sub>2-6</sub>alkenyl,
- (f) C<sub>2-6</sub>alkynyl,
- (g) C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- 30 (h) aryl,
- (i) aryl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (j) HET,
- (k) aryl C<sub>1-6</sub>alkyl,
- (l) aroyl,
- 35 (m) aryloxy,

- (n) aryl C<sub>1</sub>-6alkoxy,
- (o) CN and
- (p) C<sub>3</sub>-6cycloalkyl,

5 wherein items (d) to (g) and (p) above and the alkyl portions of item (k) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

10 wherein items (h), (i), (j), (l) and (m) above and the aryl portions of items (k) and (n) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and C<sub>1</sub>-4alkyl,

15 R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>6</sup> are each independently selected from the group consisting of:

- (1) hydrogen,
- (2) halo,
- (3) C<sub>1</sub>-6alkyl,
- (4) C<sub>2</sub>-6alkenyl,
- 20 (5) C<sub>2</sub>-6akynyl,
- (6) C<sub>3</sub>-6cycloalkyl,
- (7) C<sub>1</sub>-6alkoxy,
- (8) C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (9) aryl,
- 25 (10) aryl C<sub>1</sub>-6alkyl,
- (11) HET and
- (12) -C<sub>1</sub>-6alkyl-HET,

30 wherein items (3) to (8) above and the alkyl portions of items (10) and (12) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub> and C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2; and

wherein items (9) and (11) and the aryl portion of items (10) and the HET portion of item (12) are optionally substituted from one up to the maximum number of

substitutable positions with a substituent independently selected from the group consisting of:

5 (a) halo,  
(b) OR<sup>13</sup>,  
(c) N(R<sup>14</sup>)<sub>2</sub>,  
(d) C<sub>1-6</sub>alkyl,  
(e) C<sub>2-6</sub>alkenyl,  
(f) C<sub>2-6</sub>akynyl and  
(g) C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,

10 wherein items (d) to (g) above are optionally substituted with from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>,

15 or R<sup>1</sup> and R<sup>3</sup> or R<sup>3</sup> and R<sup>5</sup> may be joined together to form a double bond;

15 R<sup>7</sup> is selected from the group consisting of:  
(1) hydrogen,  
(2) OR<sup>13</sup>,  
20 (3) C<sub>1-4</sub>alkyl,  
(4) aryl and  
(5) aryl C<sub>1-4</sub>alkyl,

25 wherein item (3) above and the alkyl portion of item (5) above are optionally substituted with from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

30 wherein item (4) above and the aryl portion of item (5) above are optionally substituted with from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of:

35 (a) halo,  
(b) OR<sup>13</sup>,  
(c) N(R<sup>14</sup>)<sub>2</sub>,  
(d) C<sub>1-6</sub>alkyl,  
(e) C<sub>2-6</sub>alkenyl and

(f) C<sub>2</sub>-6akynyl,

wherein items (d) to (f) above are optionally substituted with from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>;

5

each Y<sub>1</sub>, Y<sub>2</sub> and Y<sub>3</sub> are independently selected from the group consisting of:

- (1) hydrogen,
- (2) -O-R<sup>9</sup>,
- (3) -S(O)<sub>k</sub>-R<sup>9</sup>, wherein k is 0, 1 or 2,
- 10 (4) -C-W-R<sup>9</sup>, wherein W is O or S(O)<sub>k</sub>,
- (5) -N(R<sup>15</sup>)<sub>2</sub>,
- (6) -S(O)<sub>k</sub>-N(R<sup>15</sup>)<sub>2</sub>,
- (7) -N(R<sup>15</sup>)-S(O)<sub>k</sub>-N(R<sup>15</sup>)<sub>2</sub>,
- (8) NO<sub>2</sub>,
- 15 (9) -C(O)-R<sup>15</sup>,
- (10) -C(O)O-R<sup>15</sup>,
- (11) -CN,
- (12) halo,
- (13) -O-S(O)<sub>k</sub>-R<sup>15</sup> and
- 20 (14) C<sub>1</sub>-4alkyl, optionally substituted with from 1 to 6 halo groups,

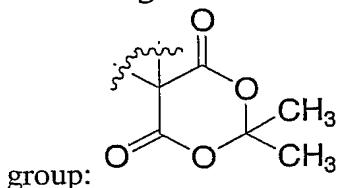
with the proviso that when Y<sub>2</sub> is hydrogen, Y<sub>3</sub> is -C(O)-R<sup>15</sup>, R<sup>15</sup> is C<sub>1</sub>-6alkyl and X is -C(O) then R<sup>10</sup> is not C<sub>1</sub>-6alkyl, and

25 with the proviso that when Y<sub>2</sub> is -C(O)-R<sup>15</sup>, Y<sub>3</sub> is hydrogen, R<sup>15</sup> is C<sub>1</sub>-6alkyl and X is -C(O) then R<sup>10</sup> is not C<sub>1</sub>-6alkyl, and

with the proviso that when Y<sub>2</sub> and Y<sub>3</sub> are both hydrogen, X is a bond and R<sup>10</sup> is HET, then said HET is defined as a 5-membered aromatic or non-aromatic  
30 monocyclic ring containing 1-3 heteroatoms selected from O, S and N,

R<sup>8</sup> is selected from the group consisting of: hydrogen, C<sub>1</sub>-6alkyl, C<sub>1</sub>-6alkoxy, -C<sub>1</sub>-6alkyl-C(O)OH and -C<sub>1</sub>-6alkyl-C(O)O-C<sub>1</sub>-6alkyl, wherein the C<sub>1</sub>-6alkyl portion is optionally mono, di or tri substituted with halo; or where R<sup>8</sup> and

-XR<sup>10</sup> together with the carbon atom to which they are attached form the spiro



5 R<sup>9</sup> is selected from the group consisting of: hydrogen, C<sub>1</sub>-12alkyl and aryl, wherein C<sub>1</sub>-12alkyl and aryl are optionally substituted from one up to the maximum number of substituents with halo;

each R<sup>11</sup>, R<sup>12</sup> and R<sup>16</sup> is independently selected from the group consisting of:

- 10 (1) hydrogen,
- (2) halo,
- (3) C<sub>1</sub>-6alkyl,
- (4) C<sub>2</sub>-6alkenyl,
- (5) C<sub>1</sub>-6alkoxy and
- (6) hydroxy,

15 wherein items (3) to (5) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>12</sup>, N(R<sup>13</sup>)<sub>2</sub> and C<sub>1</sub>-6alkyl-S(O)<sub>k</sub><sup>-</sup>, wherein k is 0, 1 or 2,

20 or R<sup>16</sup> may additionally be hydrogen;

each R<sup>13</sup> and R<sup>14</sup> is independently selected from the group consisting of hydrogen and C<sub>1</sub>-4alkyl, optionally substituted from one up to the maximum 25 number of substitutable positions with halo; and

each R<sup>15</sup> is independently selected from the group consisting of: hydrogen, C<sub>1</sub>-6alkyl, aryl and C<sub>1</sub>-12alkoxycarbonyl, wherein said C<sub>1</sub>-6alkyl and C<sub>1</sub>-12alkoxycarbonyl are optionally substituted from one up to the maximum number of 30 substitutable positions with halo and said aryl is optionally substituted from one up to

the maximum number of substitutable positions with halo and C<sub>1</sub>-4alkyl, optionally substituted with 1-3 halo groups.

5

2. A compound according to Claim 1 wherein:

J is NR<sup>1</sup>;

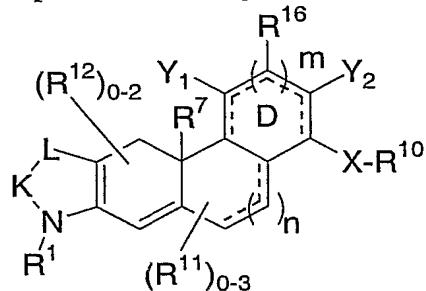
10 K is NR<sup>3</sup>;

L is C(R<sup>5</sup>)(R<sup>6</sup>); and

R<sup>3</sup> and R<sup>5</sup> are joined together to form a double bond.

15

3. A compound according to Claim 1 of Formula Ia:



20

Ia

4. A compound according to Claim 1 wherein R<sup>1</sup> is phenyl or pyridyl said phenyl or pyridyl or optionally mono or di- substituted with a substituent independently selected from the group consisting of:

25

- (a) halo,
- (b) OCH<sub>3</sub>,
- (d) CH<sub>3</sub>,
- (e) CN.

5. A compound according to Claim 4 wherein R<sup>1</sup> is phenyl, optionally mono or di-substituted with halo.

6. A compound according to Claim 3 wherein Y<sub>1</sub> is hydrogen.

5 7. A compound according to Claim 3 wherein R<sup>16</sup> is hydrogen.

8. A compound according to Claim 6 wherein R<sup>12</sup> is hydrogen.

10 9. A compound according to Claim 3 wherein R<sup>7</sup> is methyl.

10. A compound according to Claim 1 wherein  
X is a bond, -C(O), -N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-, -C(O)-N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-NH- ;  
and  
15 R<sup>14</sup> is hydrogen or methyl.

11. A compound according to Claim 1 wherein  
X is a bond, -C(O), -N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-, -C(O)-N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-NH- ;  
Y<sub>1</sub> is hydrogen;  
20 R<sup>1</sup> is phenyl, optionally mono or di-substituted with halo;  
R<sup>7</sup> is methyl.  
R<sup>11</sup> is hydrogen;  
R<sup>12</sup> is hydrogen;  
R<sup>14</sup> is hydrogen or methyl;  
25 R<sup>16</sup> is hydrogen; and  
R<sup>10</sup> are each independently selected from the group consisting of:

- (1) C<sub>1</sub>-4alkyl,
- (2) C<sub>2</sub>-4alkenyl,
- (3) C<sub>2</sub>-4akynyl,
- 30 (4) C<sub>3</sub>-6cycloalkyl,
- (5) C<sub>1</sub>-4alkoxy,
- (6) aryl,
- (7) aryl C<sub>1</sub>-4alkyl,
- (8) HET,

- (9) -C<sub>1-4</sub>alkyl-HET,
- (10) aryloxy,
- (11) aroyloxy,
- (12) aryl C<sub>2-4</sub>alkenyl,
- 5 (13) aryl C<sub>2-6</sub>alkynyl,

wherein items (1) to (5) above and the alkyl portions of items (7) and (9) above and the alkenyl portion of item (12) above and the alkynyl portion of item (13) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, C<sub>3-6</sub>cycloalkyl and C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, 10 wherein k is 0, 1 or 2, and

wherein items (6), (8), (10) and (11) above and aryl portion of items (7), (12) and (13) above and the HET portion of item (9) above are optionally substituted with from one 15 to three substituents independently selected from the group consisting of:

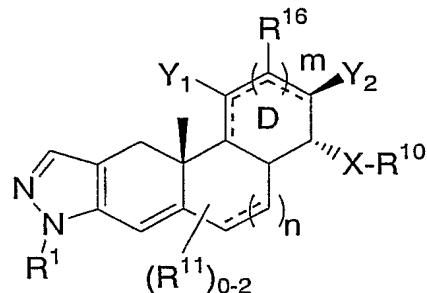
- (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- (d) C<sub>1-4</sub>alkyl,
- 20 (e) C<sub>2-4</sub>alkenyl,
- (f) C<sub>2-4</sub>akynyl,
- (g) aryl,
- (h) HET,
- (i) aryl C<sub>1-6</sub>alkyl,
- 25 (j) aroyl,
- (k) aryloxy,
- (l) aryl C<sub>1-6</sub>alkoxy and
- (m) CN,

wherein items (d) to (f) above and the alkyl portions of item (i) above are optionally 30 substituted from with one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

wherein items (g), (h), (j) and (k) above and the aryl portions of items (i) and (l) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and C<sub>1-4</sub>alkyl,

5

## 12. A compound according to Claim 1 of Formula Ib



Ib

10 wherein:

m is 0 or 1,

n is 0 or 1,

R<sup>1</sup> is phenyl, optionally mono or di-substituted with halo;R<sup>10</sup> are each independently selected from the group consisting of:15 (1) C<sub>1-6</sub>alkyl,(2) C<sub>2-6</sub>alkenyl,(3) C<sub>2-6</sub>alkynyl,(4) C<sub>3-6</sub>cycloalkyl,(5) C<sub>1-6</sub>alkoxy,20 (6) C<sub>1-6</sub>alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,

(7) aryl,

(8) aryl C<sub>1-6</sub>alkyl,

(9) HET,

(10) -C<sub>1-6</sub>alkyl-HET,

25 (11) aryloxy,

(12) aroyloxy,

(13) aryl C<sub>2-6</sub>alkenyl,(14) aryl C<sub>2-6</sub>alkynyl,

(15) hydrogen, and

## (16) hydroxy

wherein items (1) to (6) above and the alkyl portions of items (8) and (10) above and the alkenyl portion of item (13) above and the alkynyl portion of item (14) above are 5 optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, C<sub>3</sub>-6cycloalkyl and C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2, and

wherein items (7), (9), (11) and (12) above and aryl portion of items (8), (13) and (14) 10 above and the HET portion of item (10) above are optionally substituted with from one to three substituents independently selected from the group consisting of:

- (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- 15 (d) C<sub>1</sub>-6alkyl,
- (e) C<sub>2</sub>-6alkenyl,
- (f) C<sub>2</sub>-6akynyl,
- (g) C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (h) aryl,
- 20 (i) aryl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (j) HET,
- (k) aryl C<sub>1</sub>-6alkyl,
- (l) aroyl,
- (m) aryloxy,
- 25 (n) aryl C<sub>1</sub>-6alkoxy and
- (o) CN,

wherein items (d) to (g) above and the alkyl portions of item (k) above are optionally substituted from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

30 wherein items (h), (i), (j), (l) and (m) above and the aryl portions of items (k) and (n) above are optionally substituted from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and C<sub>1</sub>-4alkyl, each R<sup>13</sup> and R<sup>14</sup> is independently selected from the group consisting of hydrogen 35 and C<sub>1</sub>-4alkyl, optionally substituted from one to three halo groups;

R<sup>16</sup> and each R<sup>11</sup> are independently selected from the group consisting of:

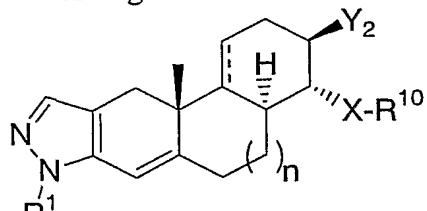
- (1) hydrogen,
- (2) halo,
- (3) methyl,
- 5 (4) methoxy, and
- (5) hydroxy;

Y<sub>1</sub> and Y<sub>2</sub> are each selected from the group consisting of:

- (1) hydrogen,
- (2) hydroxy,
- 10 (3) halo,
- (4) methyl,
- (5) -NO<sub>2</sub>,
- (6) -CN,
- (6) mono, di or tri halo substituted methyl,
- 15 X is a bond, -C(O), -N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-, -C(O)-N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-S(O)<sub>k</sub>-, -N(R<sup>14</sup>)-C(O)-NH- or -S(O)<sub>k</sub>-N(R<sup>14</sup>);

20 13. A compound according to Claim 12 wherein Y<sub>1</sub>, R<sup>11</sup> and R<sup>16</sup> are each hydrogen.

14. A compound according to Claim 12 of Formula Ic:



Ic

25 wherein

n is 0 or 1,

R<sup>1</sup> is phenyl, optionally mono or di-substituted with halo;

R<sup>10</sup> is selected from the group consisting of:

- (1) C<sub>1</sub>-6alkyl,
- 30 (2) C<sub>2</sub>-6alkenyl,

- (3) C<sub>2</sub>-6akynyl,
- (4) C<sub>3</sub>-6cycloalkyl,
- (5) C<sub>1</sub>-6alkoxy,
- (6) C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- 5 (7) aryl,
- (8) aryl C<sub>1</sub>-6alkyl,
- (9) HET,
- (10) -C<sub>1</sub>-6alkyl-HET,
- (11) aryloxy,
- 10 (12) aroyloxy,
- (13) aryl C<sub>2</sub>-6alkenyl,
- (14) aryl C<sub>2</sub>-6akynyl,
- (15) hydrogen, and
- (16) hydroxy

15

wherein items (1) to (6) above and the alkyl portions of items (8) and (10) above and the alkenyl portion of item (13) above and the alkynyl portion of item (14) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, C<sub>3</sub>-6cycloalkyl and C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-,

20 wherein k is 0, 1 or 2, and

wherein items (7), (9), (11) and (12) above and aryl portion of items (8), (13) and (14) above and the HET portion of item (10) above are optionally substituted with from one to three substituents independently selected from the group consisting of:

- 25 (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- (d) C<sub>1</sub>-6alkyl,
- (e) C<sub>2</sub>-6alkenyl,
- 30 (f) C<sub>2</sub>-6akynyl,
- (g) C<sub>1</sub>-6alkyl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (h) aryl,
- (i) aryl-S(O)<sub>k</sub>-, wherein k is 0, 1 or 2,
- (j) HET,

- (k) aryl C<sub>1-6</sub>alkyl,
- (l) aroyl,
- (m) aryloxy,
- (n) aryl C<sub>1-6</sub>alkoxy and
- 5 (o) CN,

wherein items (d) to (g) above and the alkyl portions of item (k) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

10 wherein items (h), (i), (j), (l) and (m) above and the aryl portions of items (k) and (n) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and C<sub>1-4</sub>alkyl,  
each R<sup>13</sup> and R<sup>14</sup> is independently selected from the group consisting of hydrogen and C<sub>1-4</sub>alkyl, optionally substituted with from one to three halos;

15 R<sup>16</sup> and each R<sup>11</sup> are independently selected from the group consisting of:  
(1) hydrogen,  
(2) halo,  
(3) methyl,  
(4) methoxy, and  
20 (5) hydroxy;

Y<sub>1</sub> and Y<sub>2</sub> are each selected from the group consisting of:

(1) hydrogen,  
(2) hydroxy,  
(3) halo,  
25 (4) methyl,  
(5) -NO<sub>2</sub>,  
(6) -CN,  
(6) mono, di or tri halo substituted methyl,

X is a bond, -C(O), -N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-, -C(O)-N(R<sup>14</sup>)-,  
30 -N(R<sup>14</sup>)-S(O)<sub>k</sub>-, -N(R<sup>14</sup>)-C(O)-NH- or -S(O)<sub>k</sub>-N(R<sup>14</sup>);

15. The compound according to Claim 13 wherein  
X is a bond, -C(O), -N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-, -C(O)-N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-NH- ;  
R<sup>13</sup> and R<sup>14</sup> are each independently selected from hydrogen or methyl; and

R<sup>10</sup> are each independently selected from the group consisting of:

- (1) C<sub>1</sub>-4alkyl,
- (2) C<sub>2</sub>-4alkenyl,
- (3) C<sub>2</sub>-4akynyl,
- 5 (4) C<sub>3</sub>-6cycloalkyl,
- (5) C<sub>1</sub>-4alkoxy,
- (6) aryl,
- (7) aryl C<sub>1</sub>-4alkyl,
- (8) HET,
- 10 (9) -C<sub>1</sub>-4alkyl-HET,
- (10) aryloxy,
- (11) aroyloxy,
- (12) aryl C<sub>2</sub>-4alkenyl,
- (13) aryl C<sub>2</sub>-6alkynyl,

15

wherein items (1) to (5) above and the alkyl portions of items (7) and (9) above and the alkenyl portion of item (12) above and the alkynyl portion of item (13) above are optionally substituted with from to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, C<sub>3</sub>-6cycloalkyl and C<sub>1</sub>-6alkyl-S(O)<sub>k</sub><sup>-</sup>,

20 wherein k is 0, 1 or 2, and

wherein items (6), (8), (10) and (11) above and aryl portion of items (7), (12) and (13) above and the HET portion of item (9) above are optionally substituted with from one to three substituents independently selected from the group consisting of:

- 25 (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- (d) C<sub>1</sub>-4alkyl,
- (e) C<sub>2</sub>-4alkenyl,
- 30 (f) C<sub>2</sub>-4akynyl,
- (g) aryl,
- (h) HET,
- (i) aryl C<sub>1</sub>-6alkyl,
- (j) aroyl,

- (k) aryloxy,
- (l) aryl C<sub>1-6</sub>alkoxy and
- (m) CN,

5 wherein items (d) to (f) above and the alkyl portions of item (i) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

10 wherein items (g), (h), (j) and (k) above and the aryl portions of items (i) and (l) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup> and C<sub>1-4</sub>alkyl.

16. The compound according to Claim 15 wherein X is a bond, -C(O), -N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-, -C(O)-N(R<sup>14</sup>)-, -N(R<sup>14</sup>)-C(O)-NH- ; R<sup>13</sup> and R<sup>14</sup> are each independently from hydrogen or methyl; and

15 R<sup>10</sup> are each independently selected from the group consisting of:

- (1) C<sub>3-6</sub>cycloalkyl,
- (2) aryl,
- (3) aryl C<sub>1-4</sub>alkyl,
- (4) HET,
- 20 (5) -C<sub>1-4</sub>alkyl-HET,
- (6) aryl C<sub>2-4</sub>alkenyl,

25 wherein item (1) above and the alkyl portions of items (3) and (5) above and the alkenyl portion of item (8) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup>, N(R<sup>14</sup>)<sub>2</sub>, and

wherein the aryl portion of items (2), (3), (6) and the HET portion of item (4) and (5) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of:

- 30 (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- (d) C<sub>1-4</sub>alkyl,
- (e) C<sub>2-4</sub>alkenyl,
- 35 (f) C<sub>2-4</sub>akynyl,

- (g) aryl,
- (h) HET,
- (i) aryl C<sub>1-6</sub>alkyl,
- (j) aroyl,
- 5 (k) aryloxy,
- (l) aryl C<sub>1-6</sub>alkoxy and
- (m) CN,

wherein items (d) to (f) above and the alkyl portions of item (i) above are optionally substituted from one up to the maximum number of substitutable positions with a 10 substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

15 wherein items (g), (h), (j) and (k) above and the aryl portions of items (i) and (l) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and C<sub>1-4</sub>alkyl.

17. The compound according to Claim 16 wherein R<sup>10</sup> are each independently selected from the group consisting of:

- 20 (1) C<sub>3-6</sub>cycloalkyl,
- (2) aryl,
- (3) aryl C<sub>1-4</sub>alkyl,
- (4) HET,
- (5) -C<sub>1-4</sub>alkyl-HET,
- 25 (6) aryl C<sub>2-4</sub>alkenyl,

wherein item (1) above and the alkyl portions of items (3) and (5) above and the alkenyl portion of item (8) above are optionally substituted with from one to three substituents independently selected from the group consisting of: halo, OR<sup>13</sup>, 30 N(R<sup>14</sup>)<sub>2</sub>, and

wherein the HET portion of item (4) and (5) are optionally substituted with from one to three substituents selected from the group consisting of C<sub>1-4</sub>alkyl and aryl, and

35 wherein the aryl portion of items (2), (3), (6) above are optionally substituted with from one to three substituents independently selected from the group consisting of:

- (a) halo,
- (b) OR<sup>13</sup>,
- (c) N(R<sup>14</sup>)<sub>2</sub>,
- (d) C<sub>1-4</sub>alkyl,
- 5 (e) C<sub>2-4</sub>alkenyl,
- (f) C<sub>2-4</sub>akynyl,
- (g) aryl,
- (h) HET,
- (i) aryl C<sub>1-6</sub>alkyl,
- 10 (j) aroyl,
- (k) aryloxy,
- (l) aryl C<sub>1-6</sub>alkoxy and
- (m) CN,

wherein items (d) to (f) above and the alkyl portions of item (i) above are optionally 15 substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and N(R<sup>14</sup>)<sub>2</sub>, and

20 wherein items (g), (h), (j) and (k) above and the aryl portions of items (i) and (l) above are optionally substituted from one up to the maximum number of substitutable positions with a substituent independently selected from the group consisting of: halo, OR<sup>13</sup> and C<sub>1-4</sub>alkyl.

18. The compound according to Claim 3 wherein Y<sub>2</sub> is CF<sub>3</sub>.

25

19. The compound according to Claim 18 wherein R<sup>10</sup> is selected from the group consisting of:

- (1) phenyl,
- (2) benzyl, and
- 30 (3) HET, wherein HET is a 5-membered aromatic or non-aromatic monocyclic ring containing 1-3 heteroatoms selected from O, S and N,

wherein groups (1) to (3) above are optionally substituted with 1 to 3 substituents independently selected from the group consisting of:

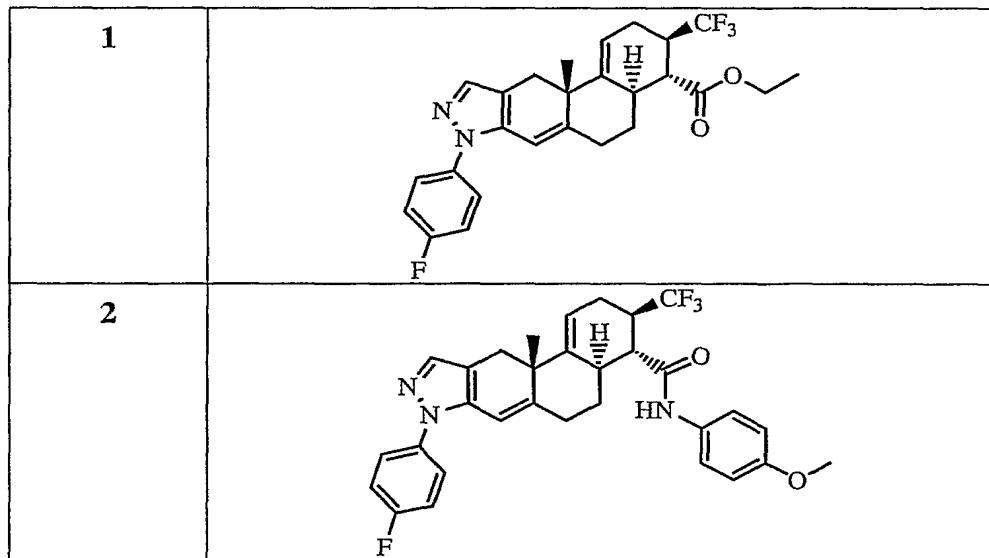
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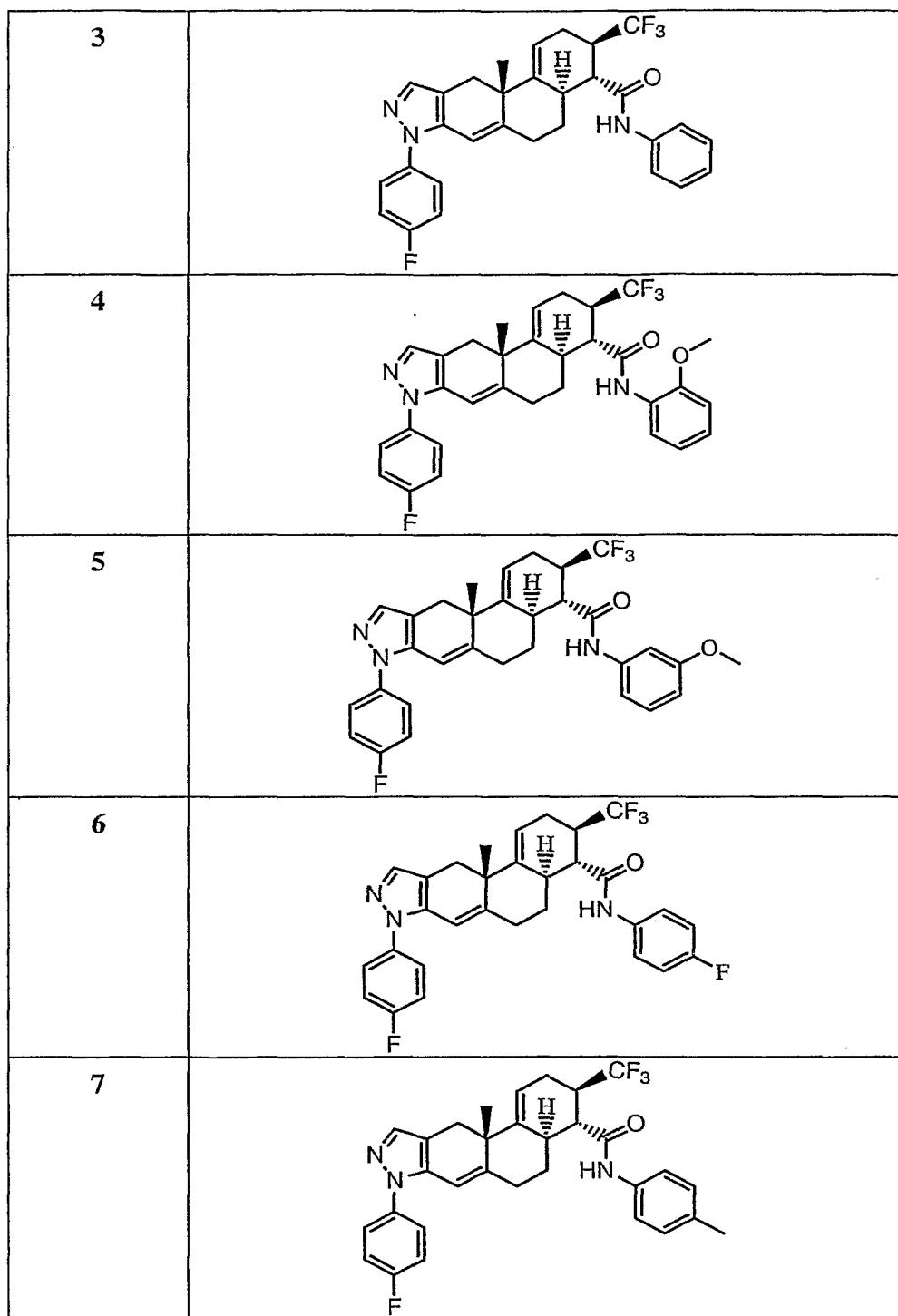
(a) halo,  
 (b) C<sub>1-4</sub>alkyl, optionally substituted with hydroxy or 1 to 3  
 halo groups,  
 5      groups,  
 (c) C<sub>1-4</sub>alkoxy, optionally substituted with 1 to 3 halo  
 (d) NH<sub>2</sub>,  
 (e) hydroxy, and  
 (e) phenyl or benzyl.

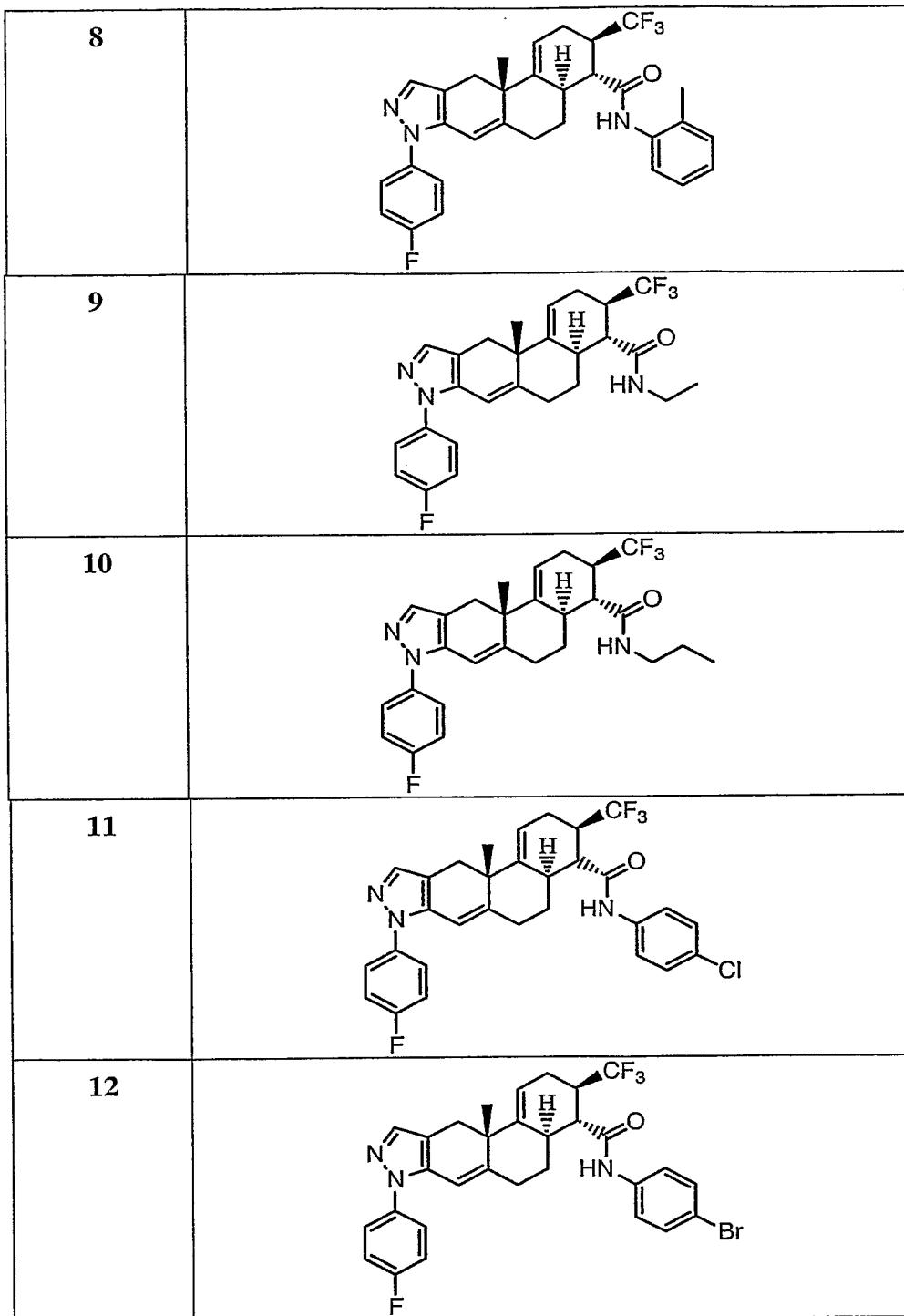
10            20.      The compound according to Claim 3 wherein Y<sub>2</sub> is hydrogen,  
 X is a bond and R<sup>10</sup> is HET, wherein HET is a 5-membered aromatic or non-aromatic  
 monocyclic ring containing 1-3 heteroatoms selected from O, S and N.

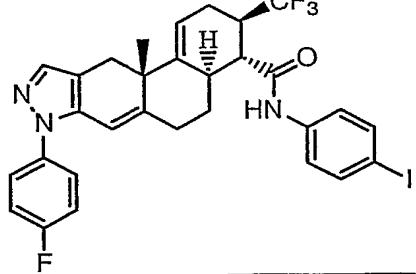
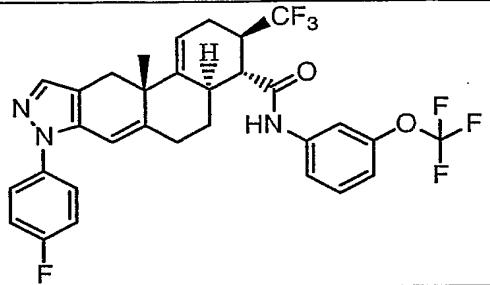
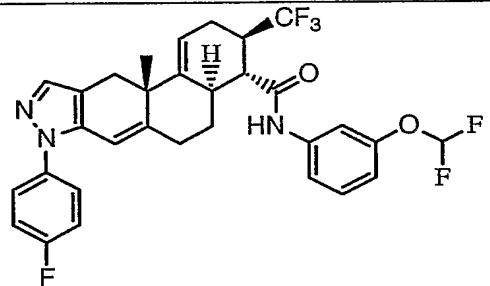
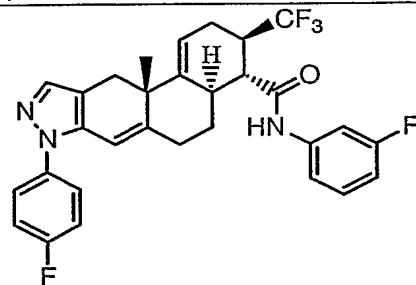
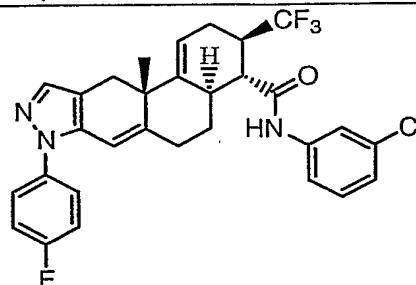
15            21.      The compound according to Claim 20 wherein HET is selected  
 from oxazolyl and imidazolyl.

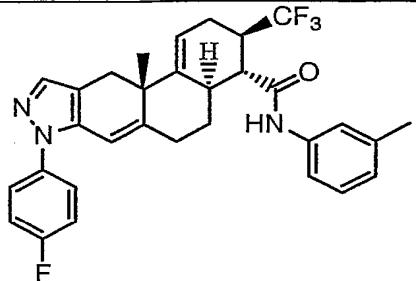
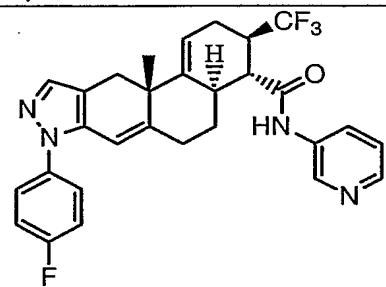
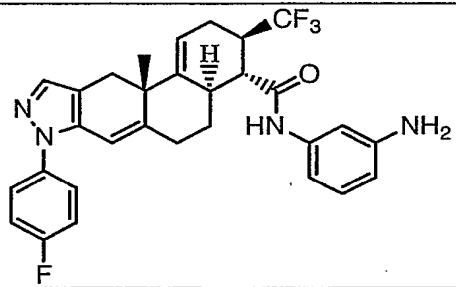
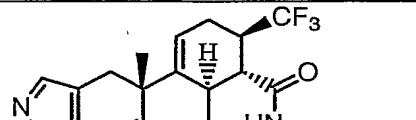
22.      A compound selected from the group consisting of:



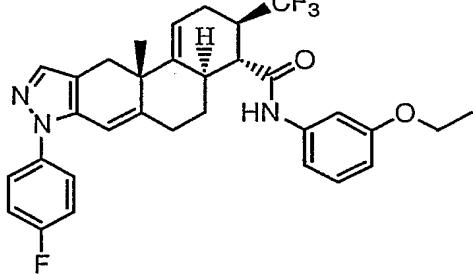
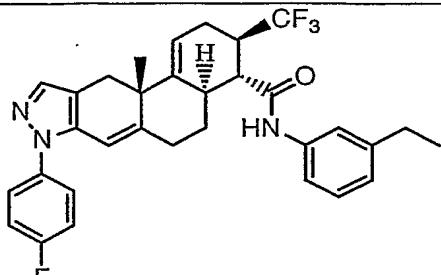
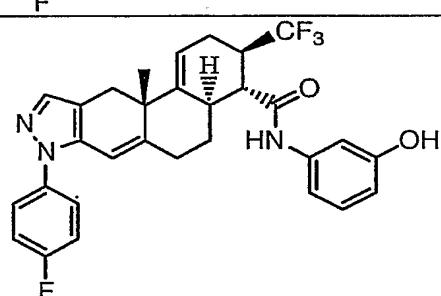
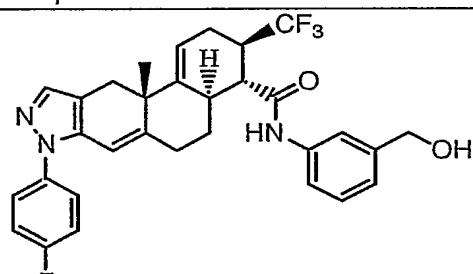
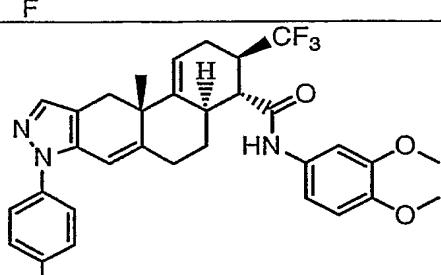




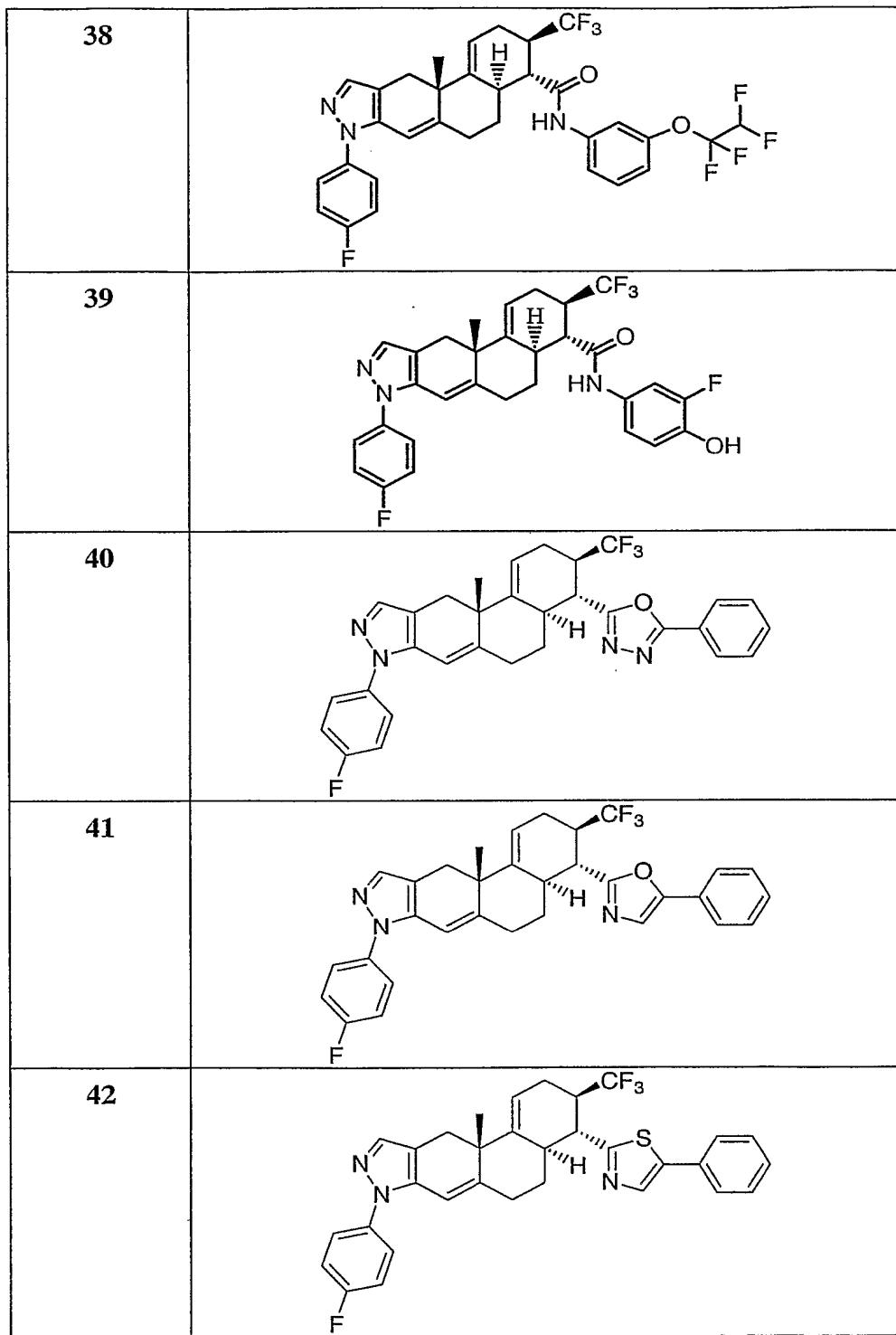
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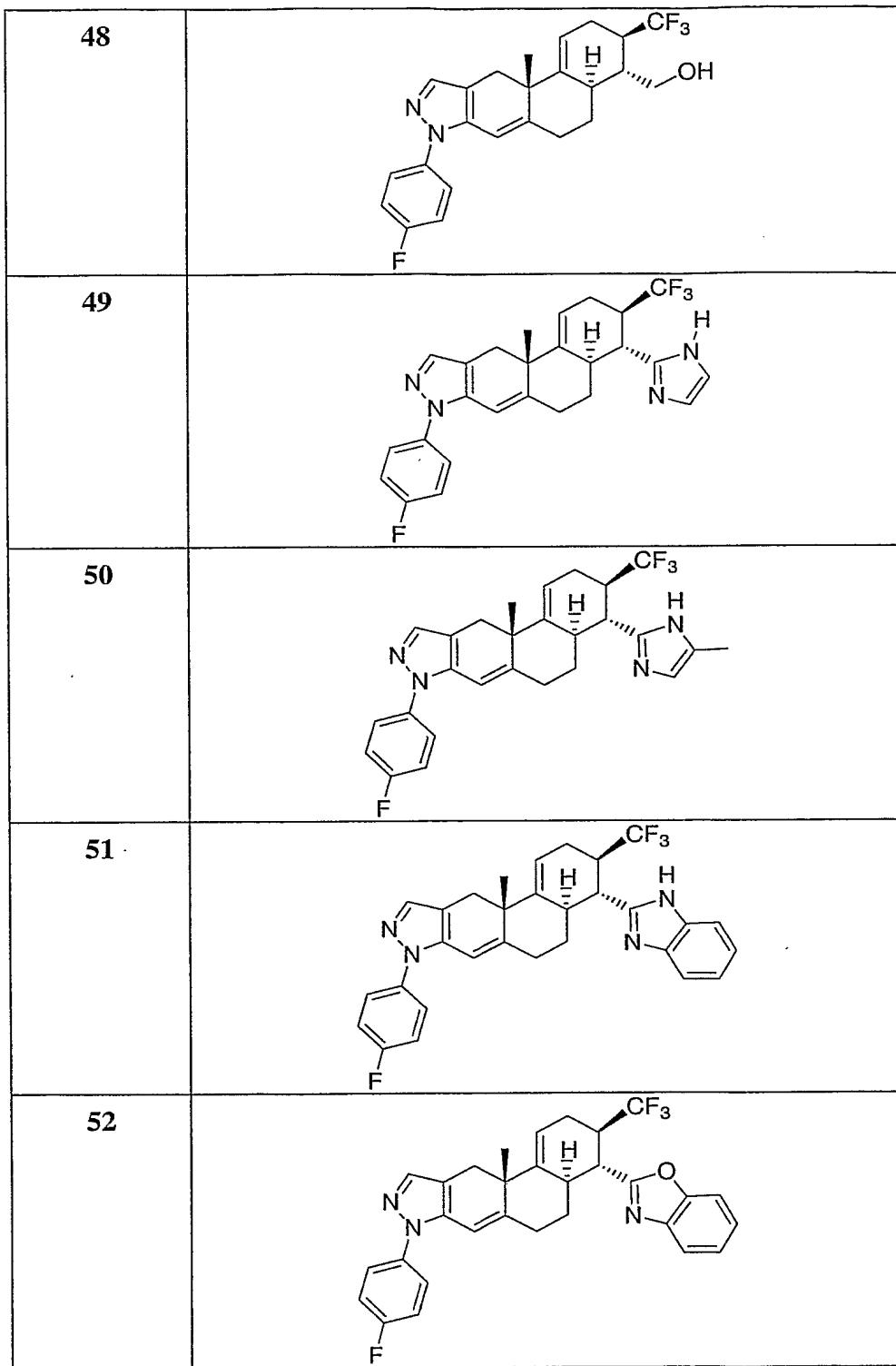
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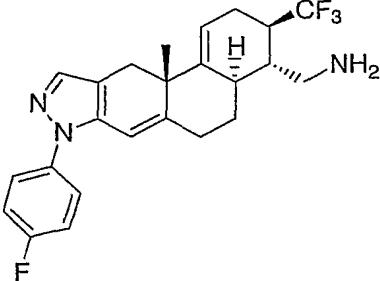
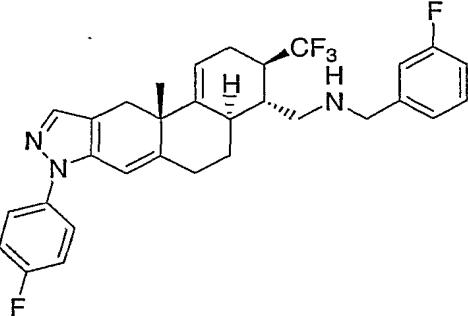
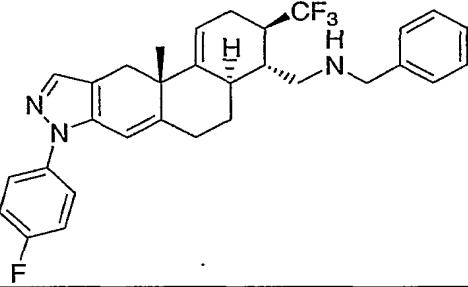
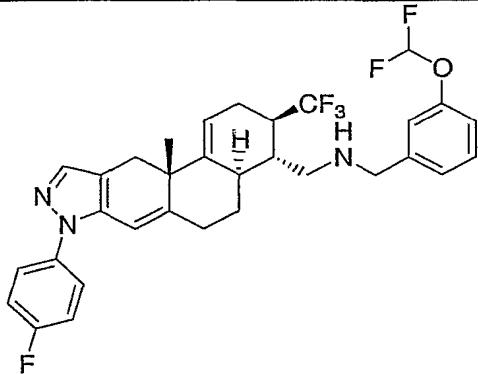
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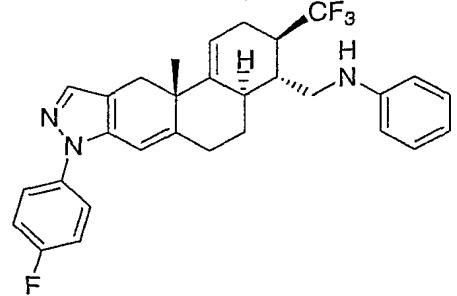
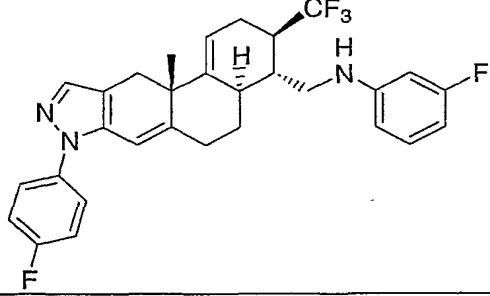
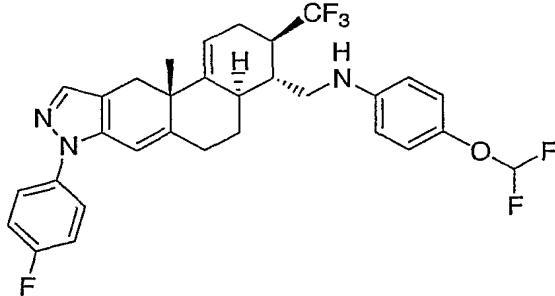
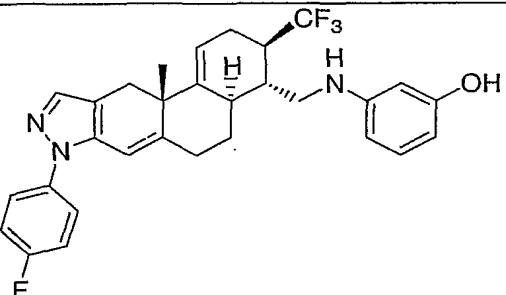
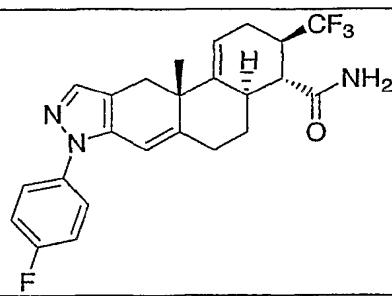
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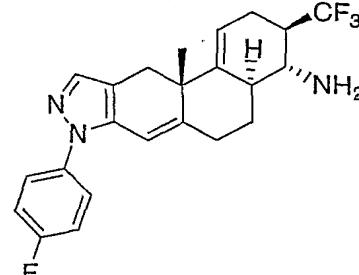
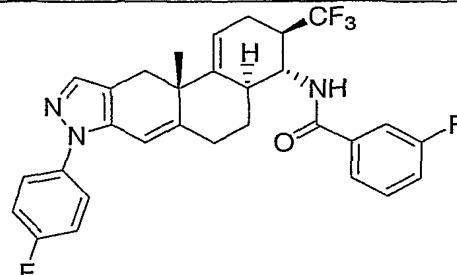
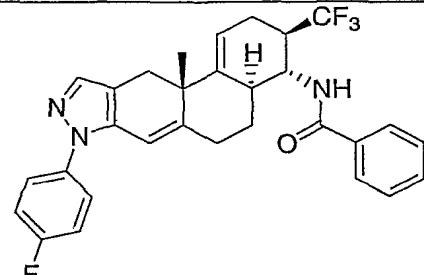
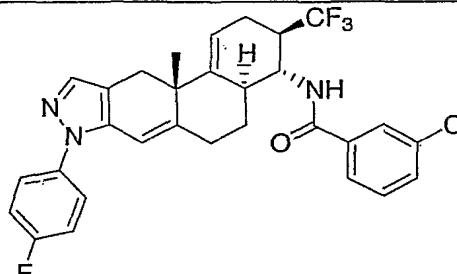
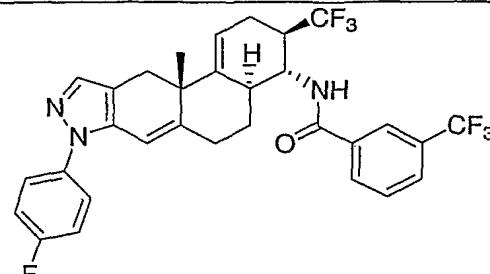


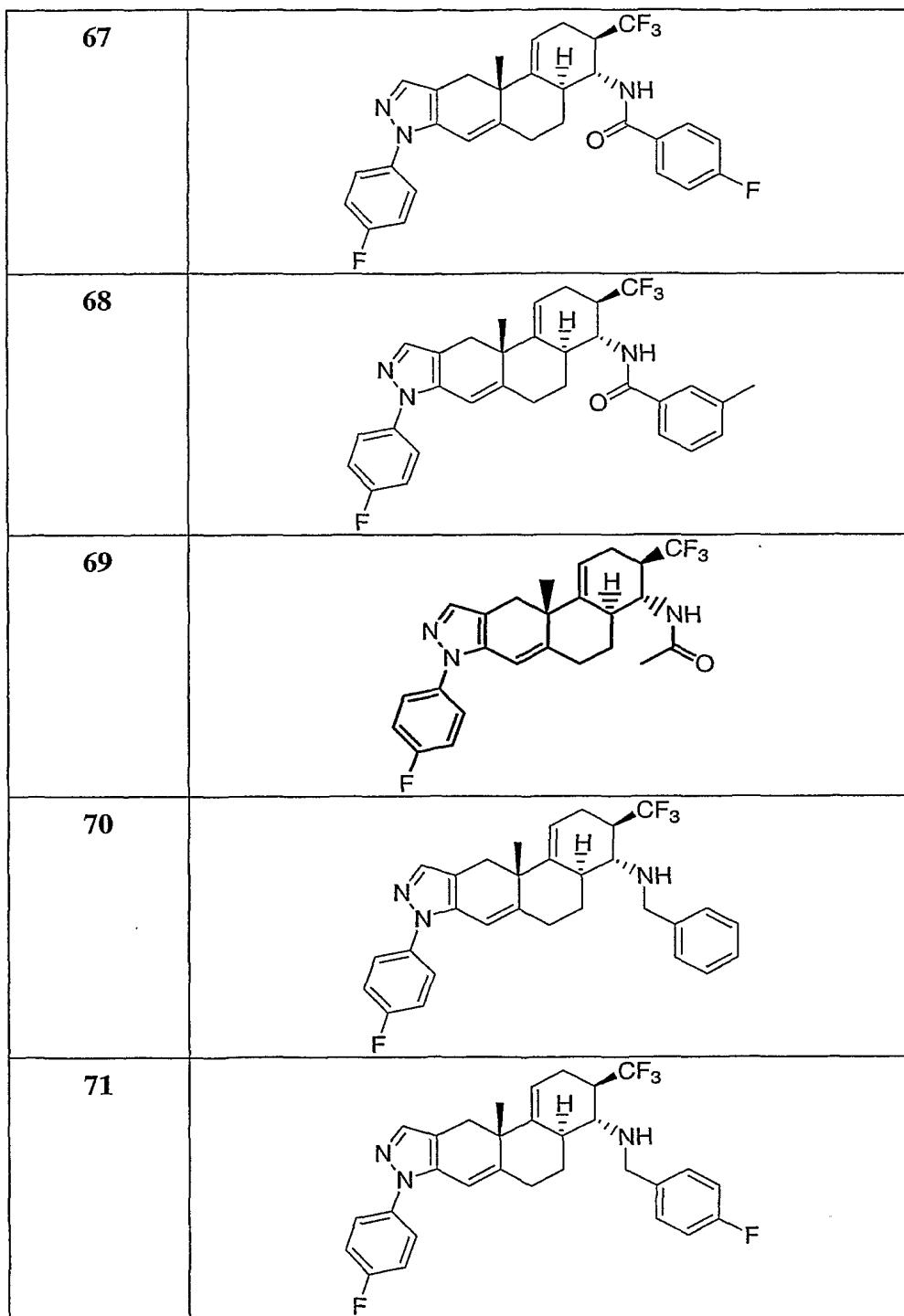
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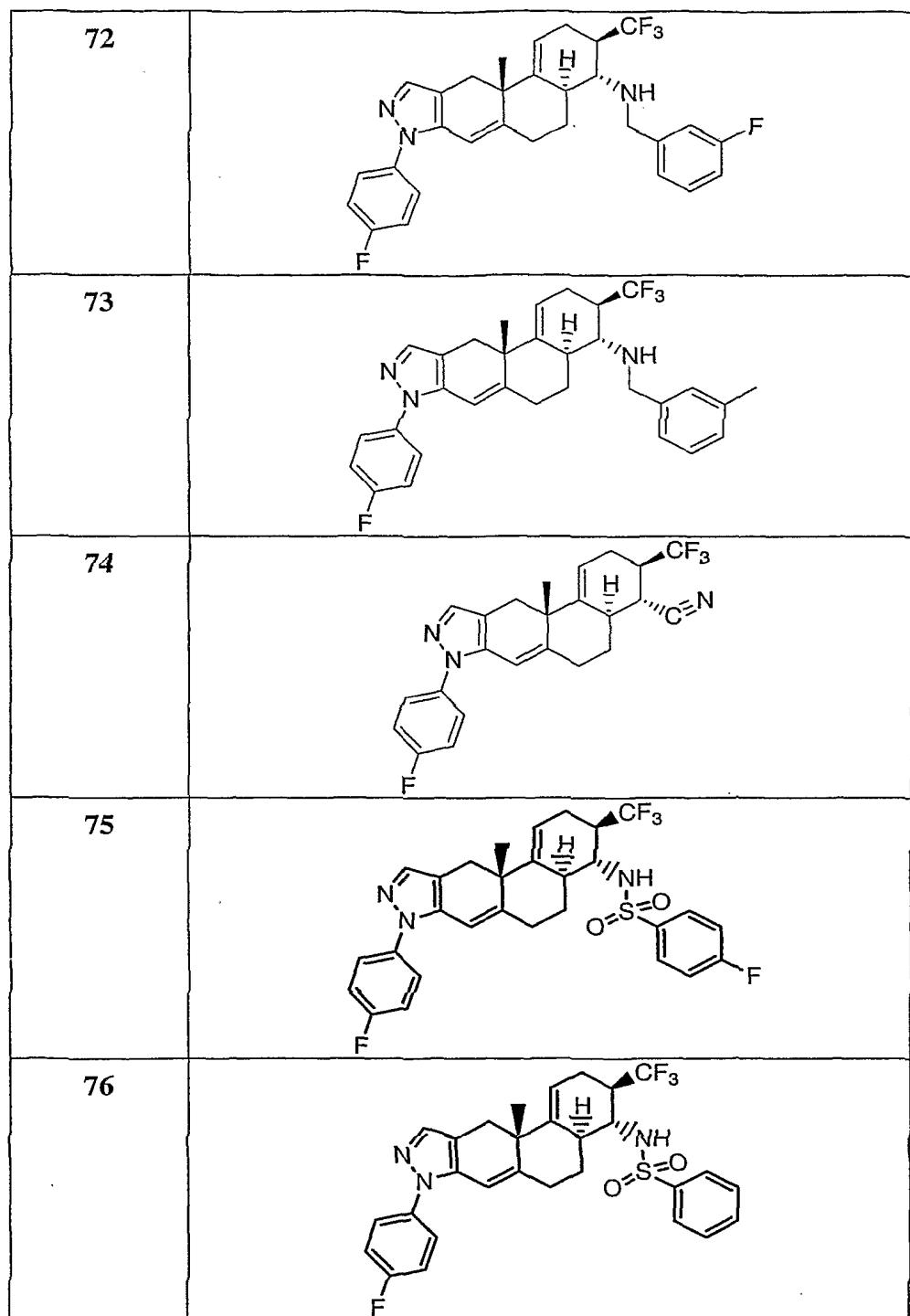


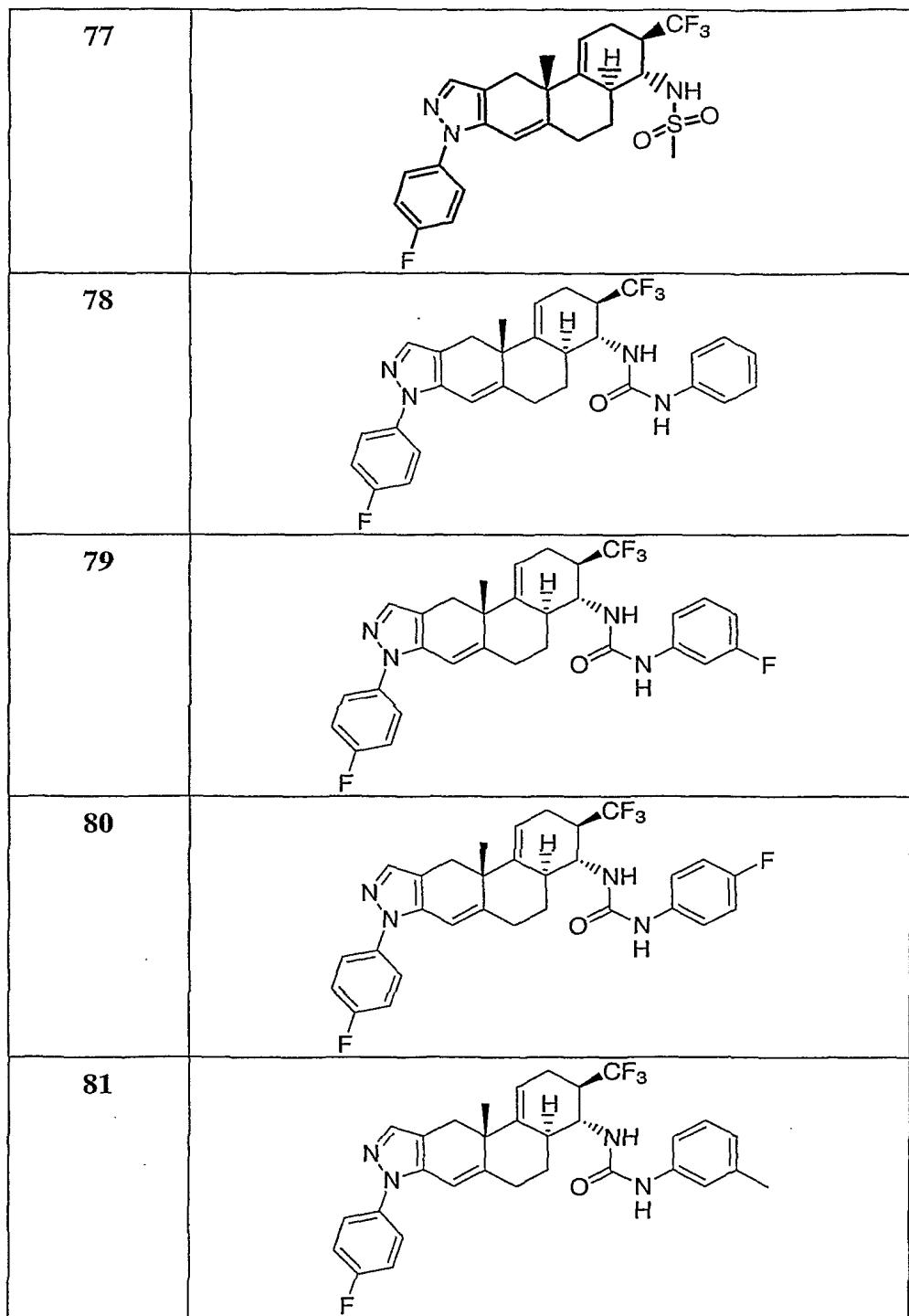
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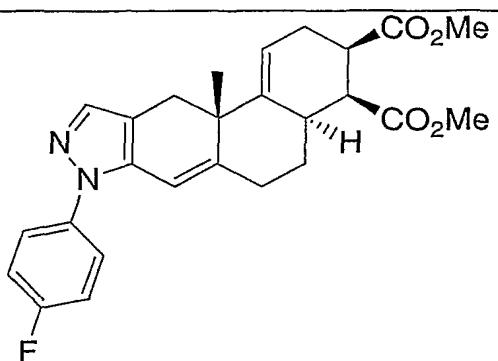
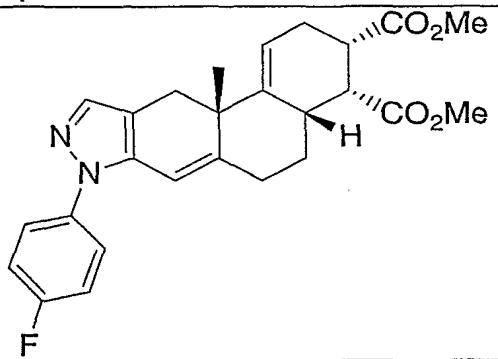
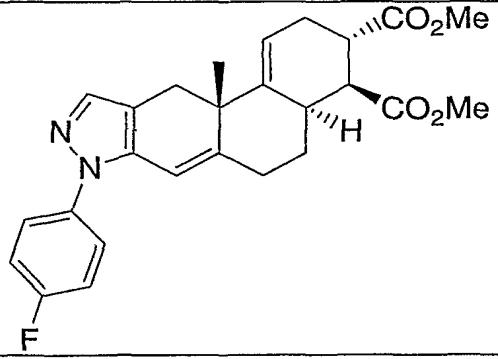
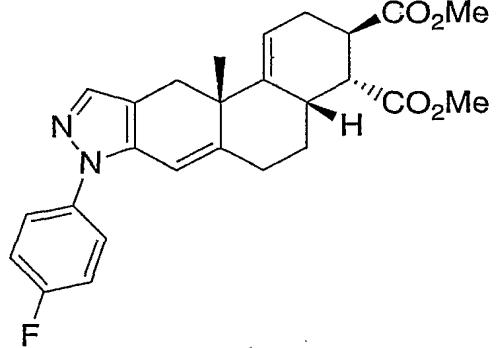
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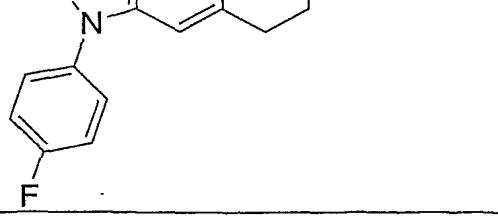
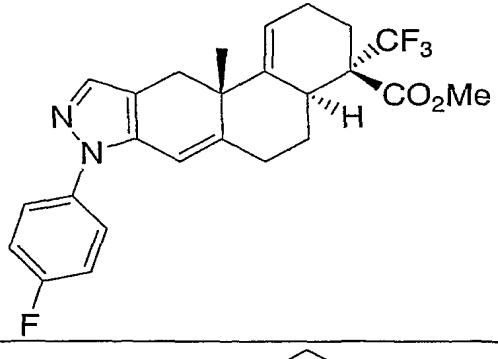
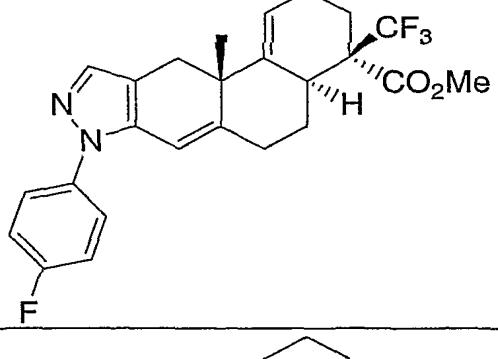
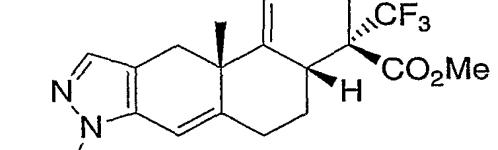
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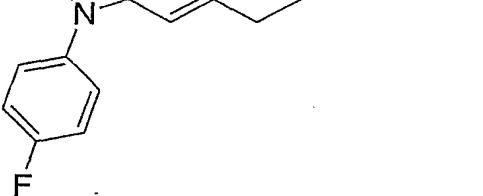
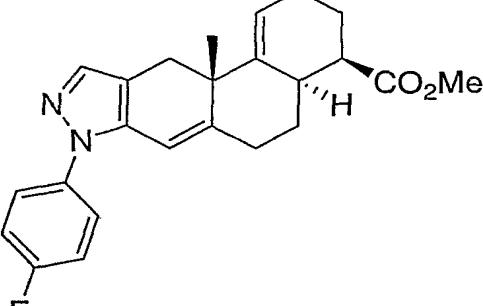
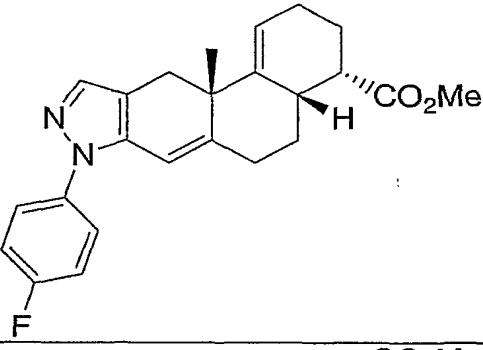
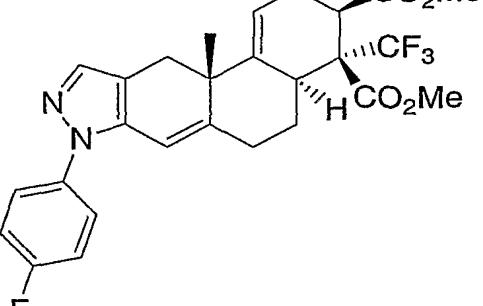


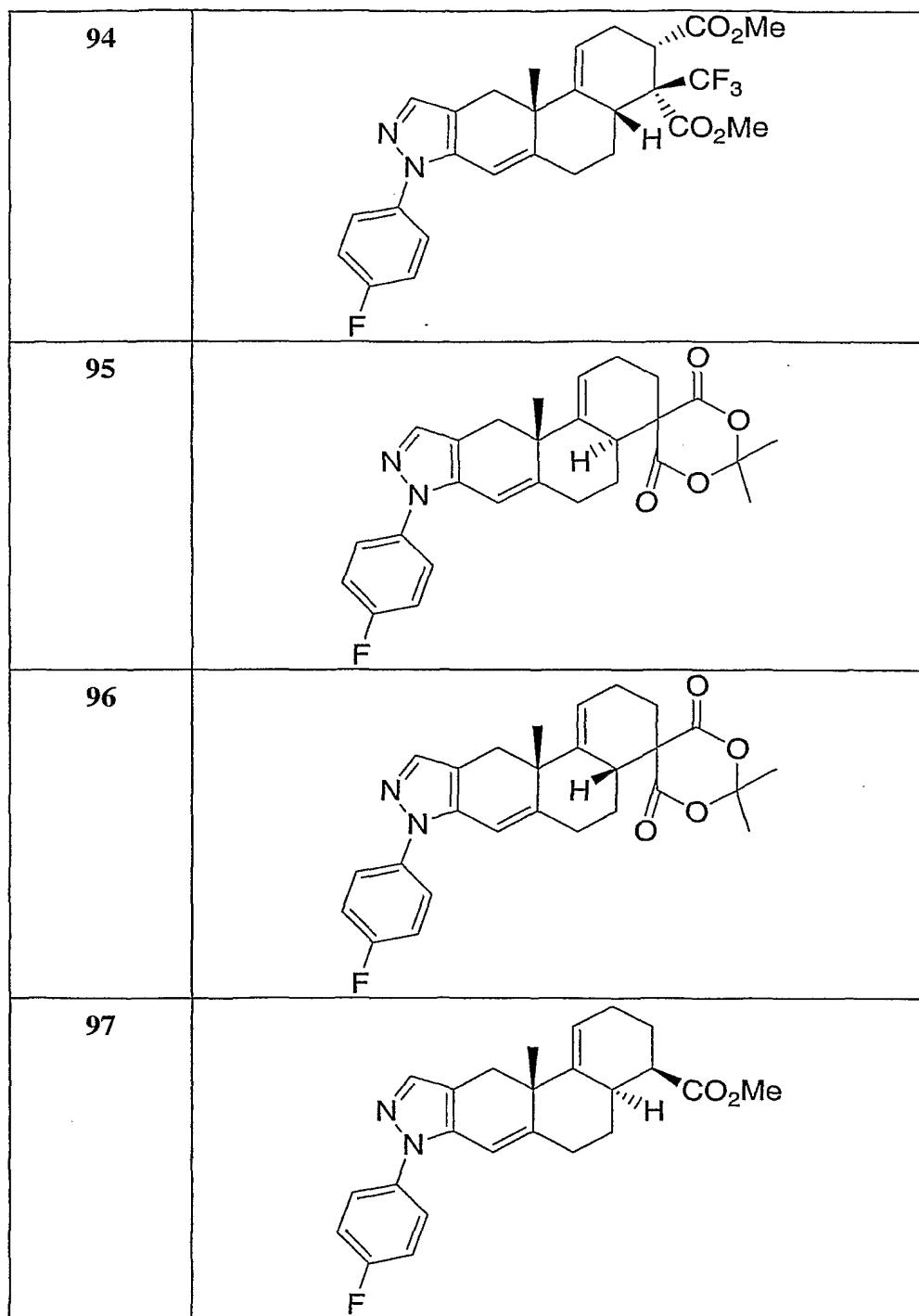


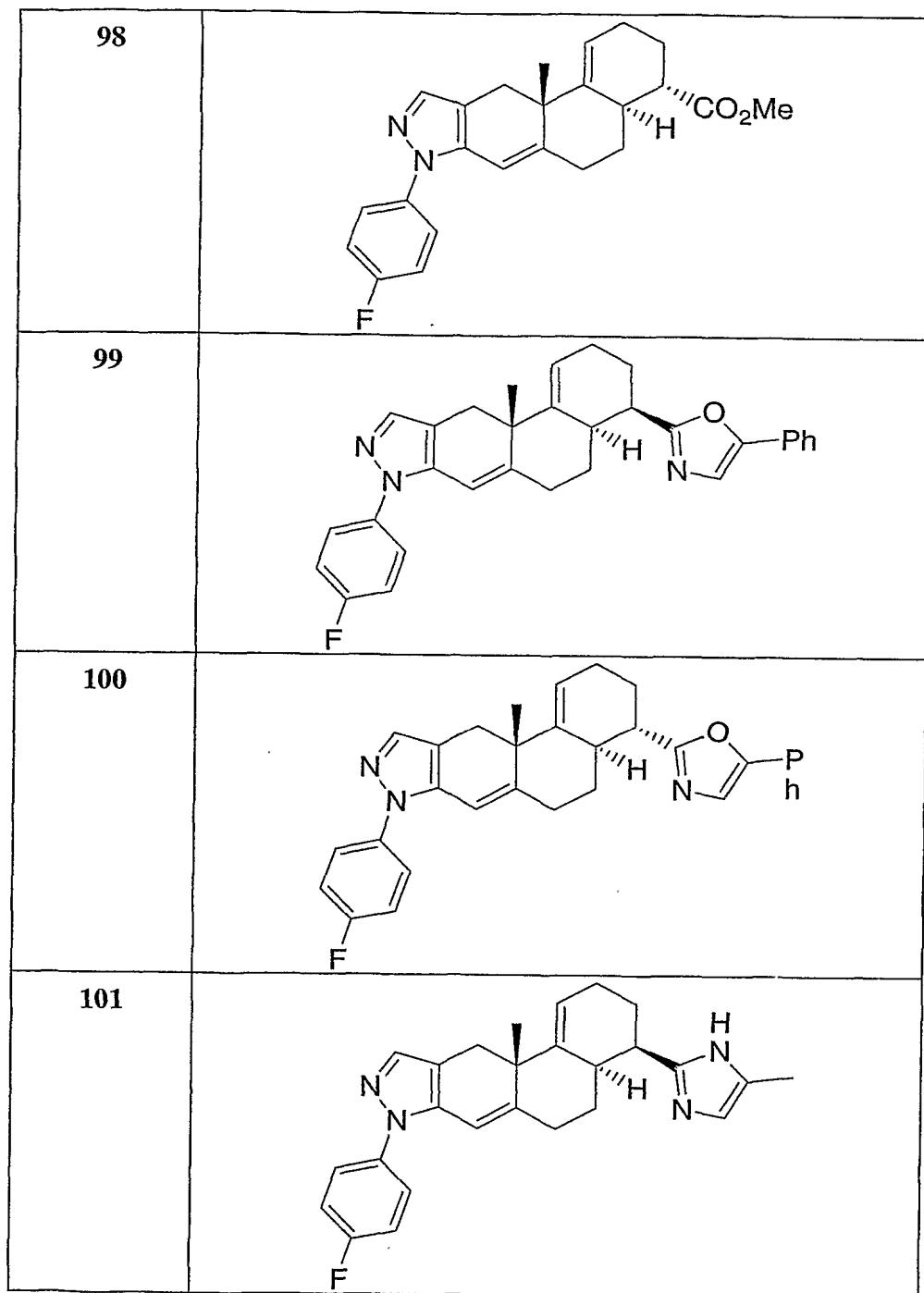


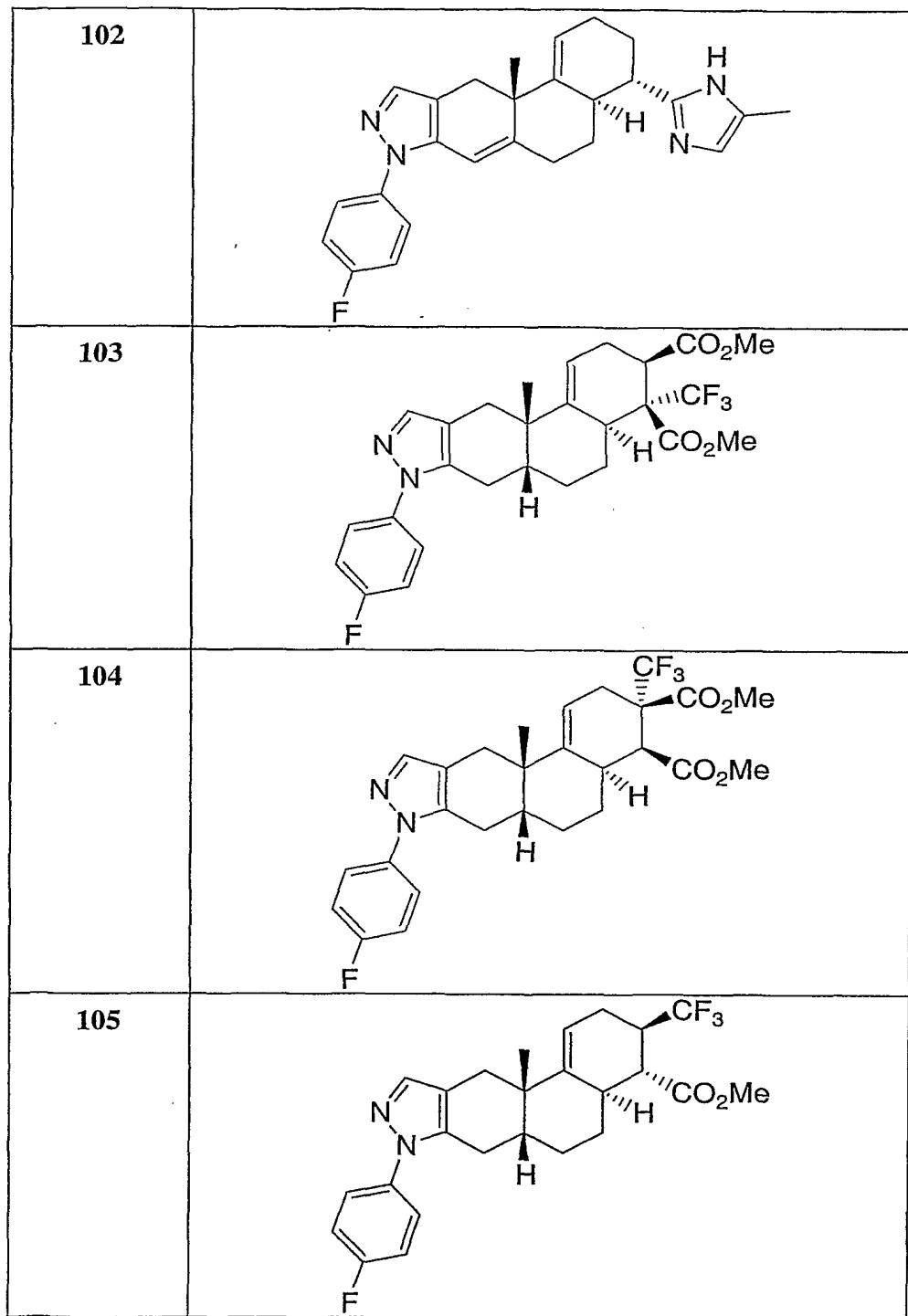
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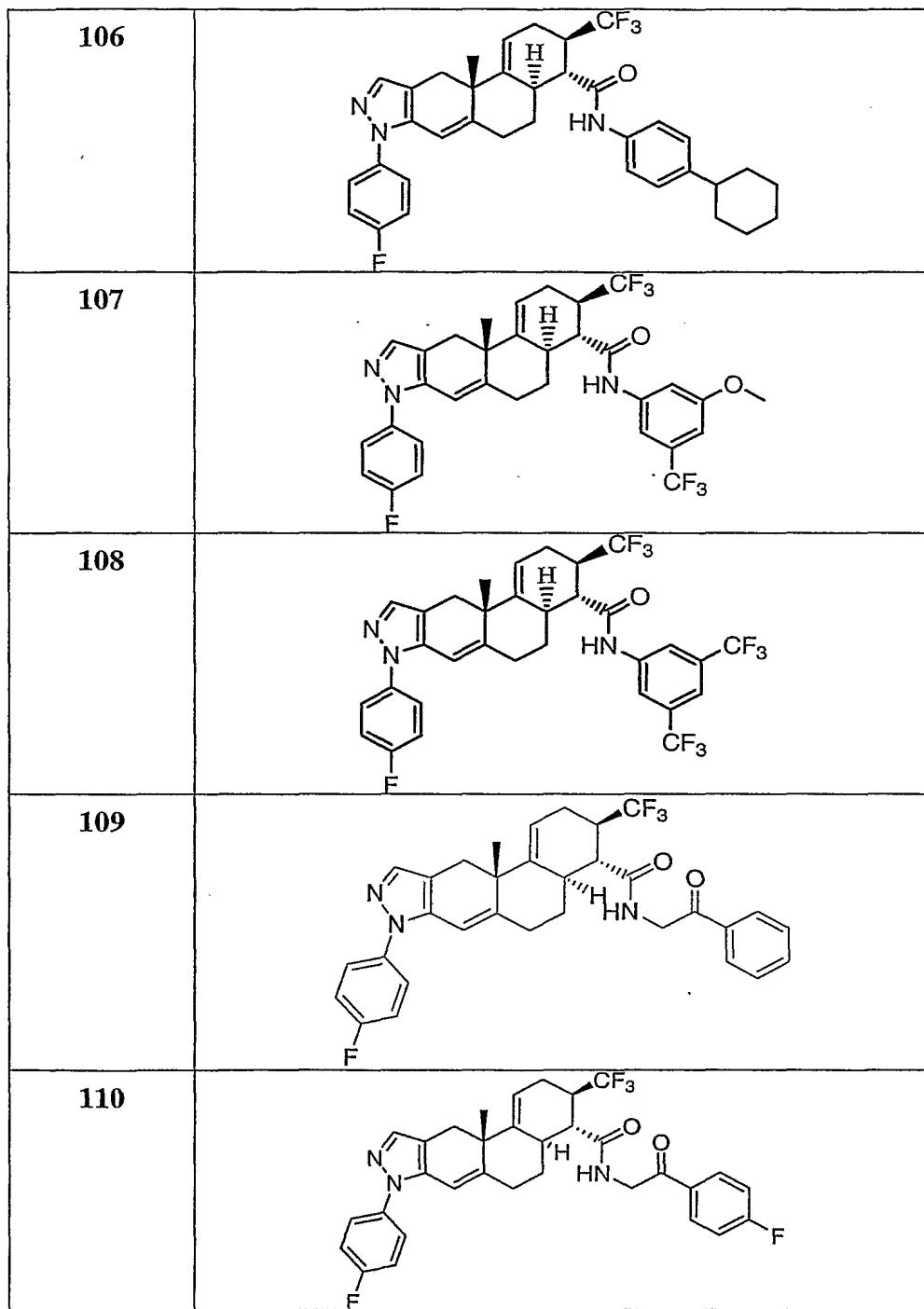
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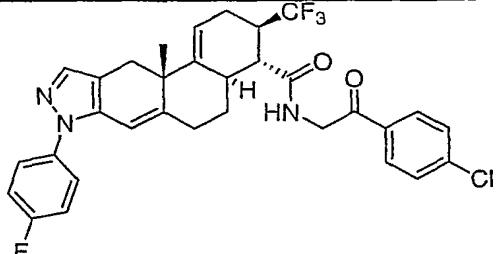
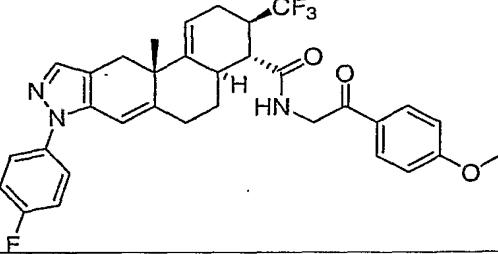
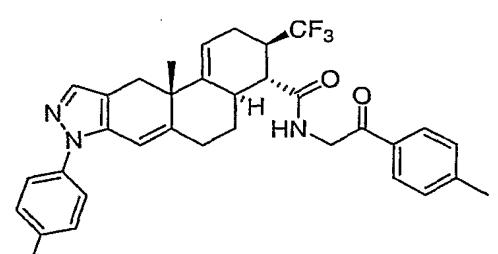
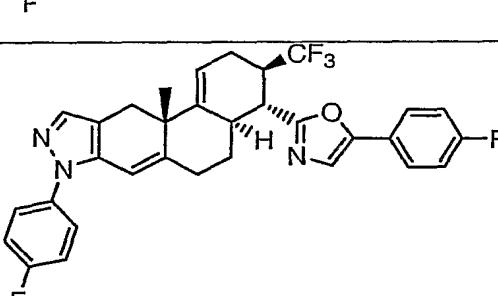
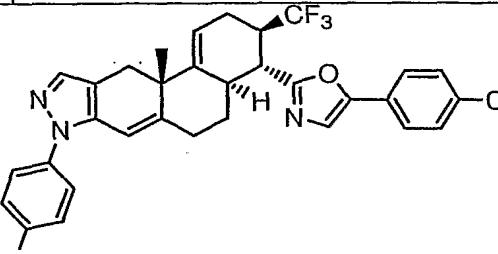
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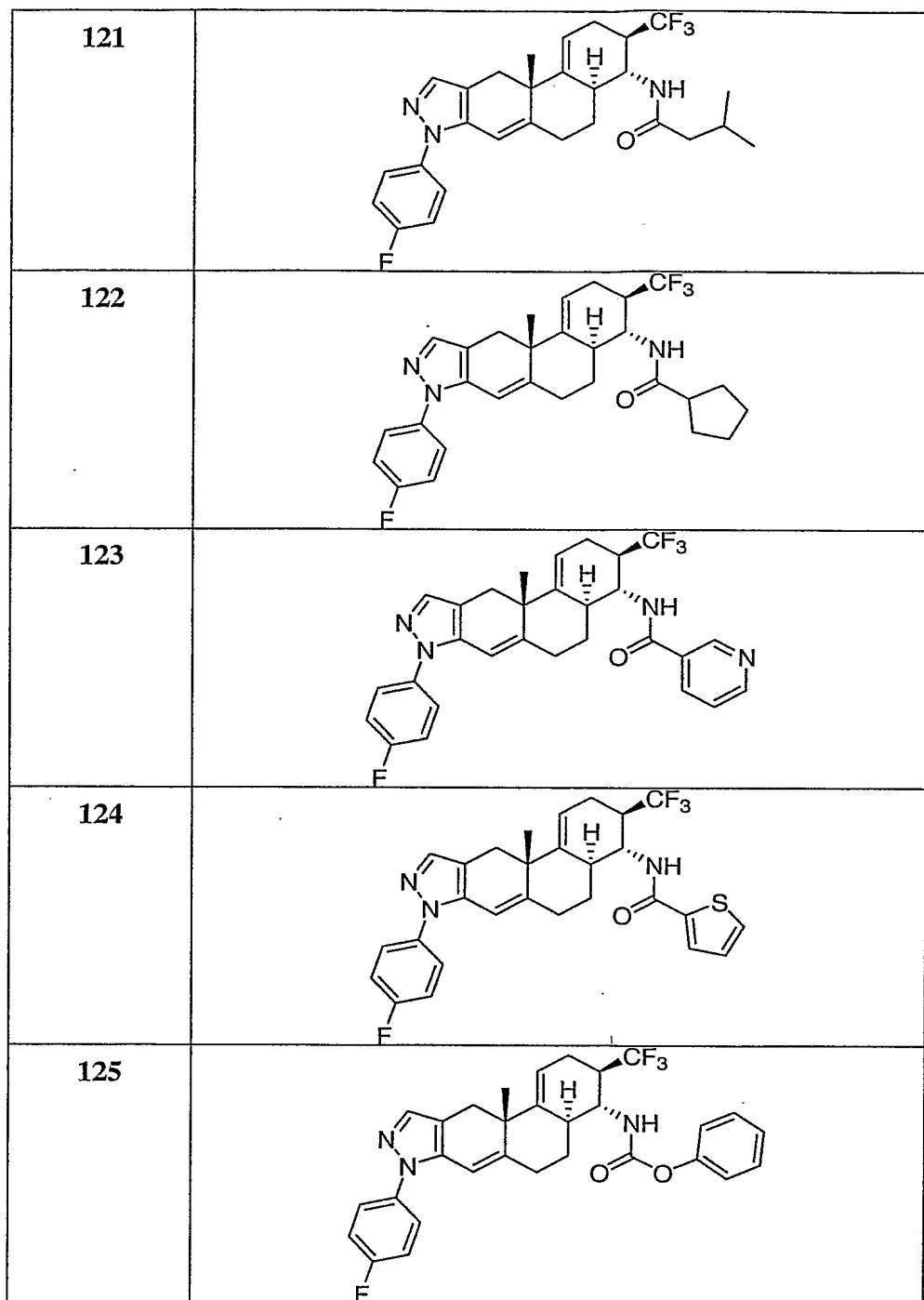


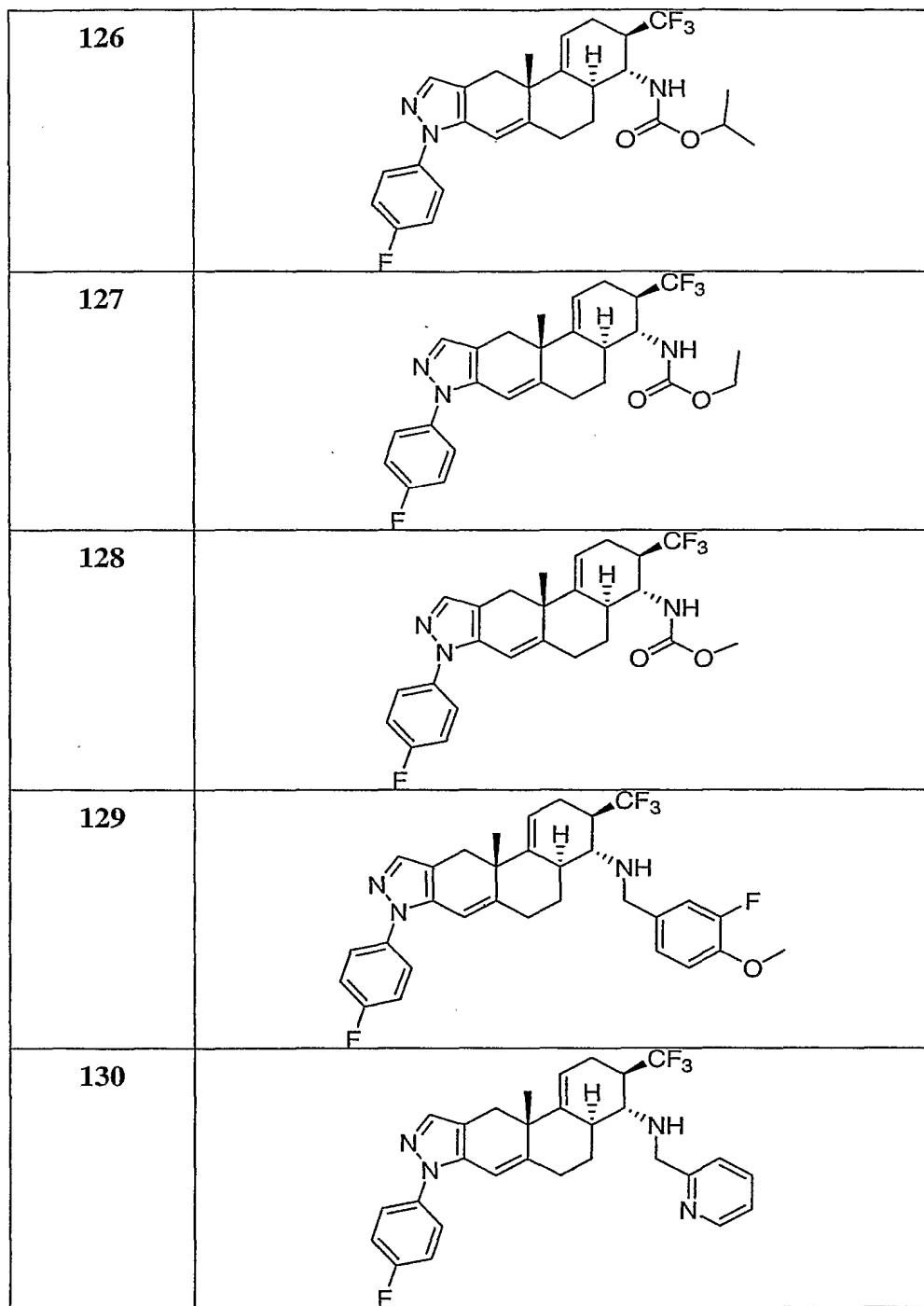


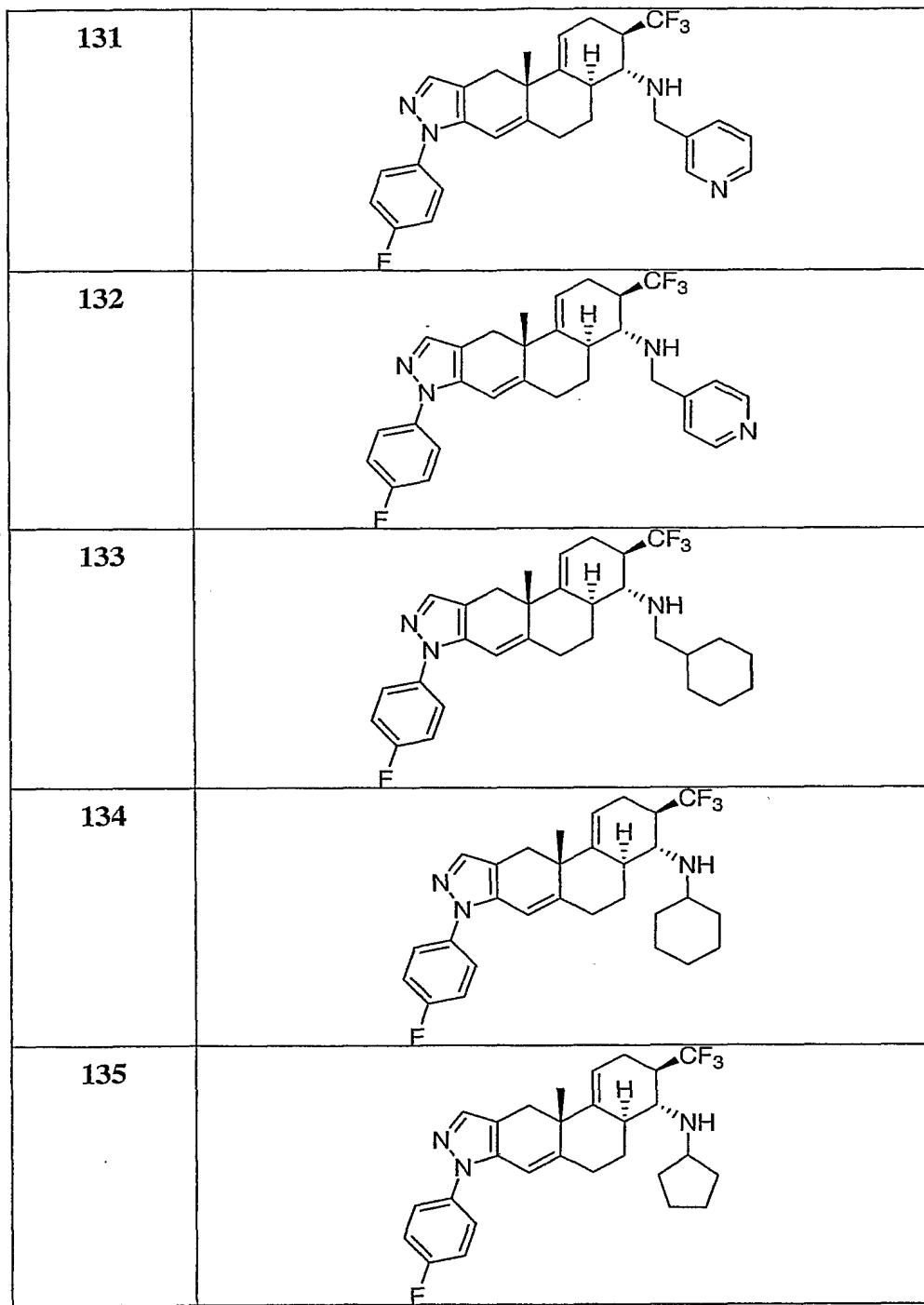


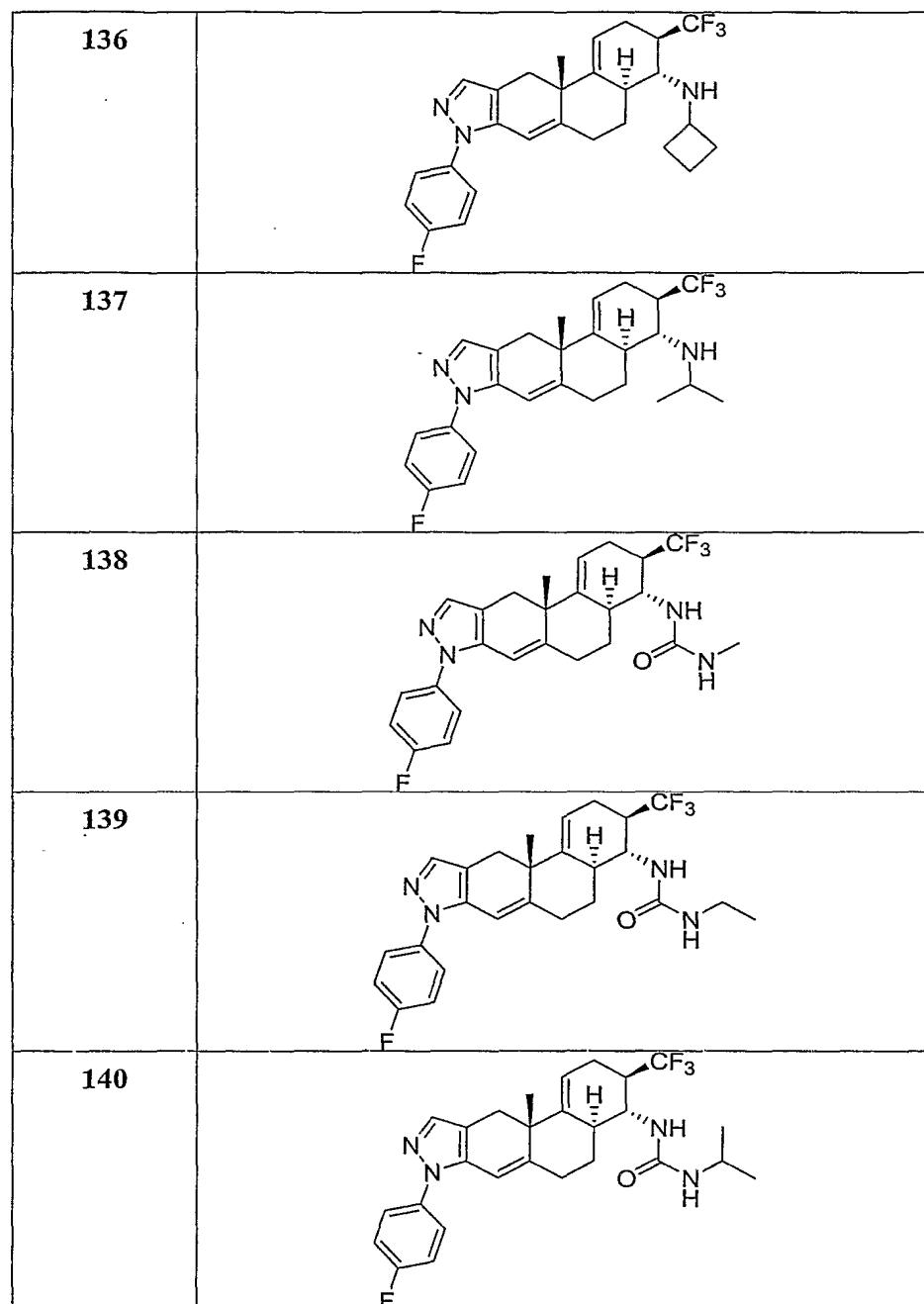
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23. A pharmaceutical composition comprising a compound according to Claim 1 in combination with a pharmaceutically acceptable carrier.

24. A method for treating a glucocorticoid receptor mediated disease or condition in a mammalian patient in need of such treatment comprising administering the patient a compound according to Claim 1 in an amount that is effective for treating the glucocorticoid receptor mediated disease or condition.

25. The method according to Claim 24 wherein the glucocorticoid receptor mediated disease or condition is selected from the group consisting of: tissue rejection, leukemias, lymphomas, Cushing's syndrome, acute adrenal insufficiency, 10 congenital adrenal hyperplasia, rheumatic fever, polyarteritis nodosa, granulomatous polyarteritis, inhibition of myeloid cell lines, immune proliferation/apoptosis, HPA axis suppression and regulation, hypercortisolemia, stroke and spinal cord injury, hypercalcemia, hyperglycemia, acute adrenal insufficiency, chronic primary adrenal insufficiency, secondary adrenal insufficiency, congenital adrenal hyperplasia, 15 cerebral edema, thrombocytopenia, Little's syndrome, obesity, metabolic syndrome, inflammatory bowel disease, systemic lupus erythematosus, polyartitis nodosa, Wegener's granulomatosis, giant cell arteritis, rheumatoid arthritis, juvenile rheumatoid arthritis, uveitis, hay fever, allergic rhinitis, urticaria, angioneurotic edema, chronic obstructive pulmonary disease, asthma, tendonitis, bursitis, Crohn's 20 disease, ulcerative colitis, autoimmune chronic active hepatitis, organ transplantation, hepatitis, cirrhosis, inflammatory scalp alopecia, panniculitis, psoriasis, discoid lupus erythematosus, inflamed cysts, atopic dermatitis, pyoderma gangrenosum, pemphigus vulgaris, buflous pernphigoid, systemic lupus erythematosus, dermatomyositis, herpes gestationis, eosinophilic fasciitis, relapsing polychondritis, inflammatory vasculitis, 25 sarcoidosis, Sweet's disease, type I reactive leprosy, capillary hemangiomas, contact dermatitis, atopic dermatitis, lichen planus, exfoliative dermatitus, erythema nodosum, acne, hirsutism, toxic epidermal necrolysis, erythema multiform, cutaneous T-cell lymphoma, Human Immunodeficiency Virus (HIV), cell apoptosis, cancer, Kaposi's sarcoma, retinitis pigmentosa, cognitive performance, memory and learning 30 enhancement, depression, addiction, mood disorders, chronic fatigue syndrome, schizophrenia, sleep disorders, and anxiety.

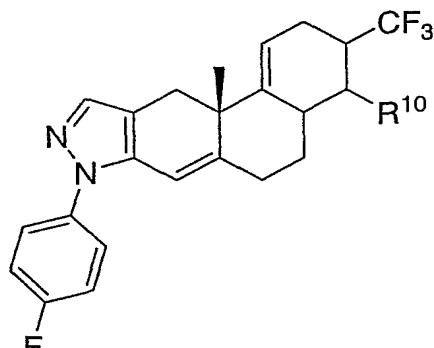
26. The method according to Claim 24 wherein the glucocorticoid receptor mediated disease or condition is selected from the group consisting of: tissue 35 rejection, Cushing's syndrome, inflammatory bowel disease, systemic lupus

erythematosus, rheumatoid arthritis, juvenile rheumatoid arthritis, hay fever, allergic rhinitis, asthma, organ transplantation, inflammatory scalp alopecia, psoriasis, discoid lupus erythematosus, and depression.

5 27. A method of selectively modulating the activation, repression, agonism and antagonism effects of the glucocorticoid receptor in a mammal comprising administering to the mammal a compound according to Claim 1 in an amount that is effective to modulate the glucocorticoid receptor.

10 28. A method of partially or fully antagonizing, repressing agonizing or modulating the glucocorticoid receptor in a mammal comprising administering to the mammal an effective amount of compound according to Claim 1.

15 29. A compound according to Claim 1 of Formula Id



Id

or a pharmaceutically acceptable salt thereof, wherein

20 R10 is a 5-membered aromatic or non-aromatic mono-cyclic ring containing 1-3 heteroatoms selected from O, S, and N, and

25 R10 is mono-substituted with phenyl, wherein phenyl is optionally substituted with 1-3 substituents independently selected from halo, C1-4alkyl and C1-4alkoxy.

30. The compound according to Claim 29 wherein R10 is oxazolyl, oxadiazolyl or thiazolyl.

31. The compound according to Claim 30 wherein R<sup>10</sup> is oxazolyl.

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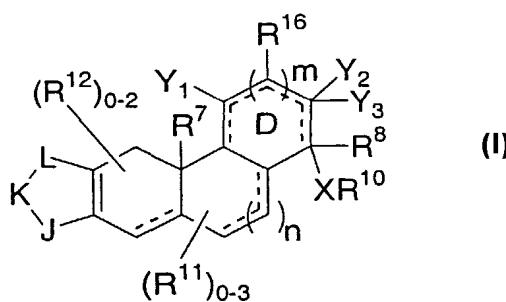
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: OCTAHYDRO-2-H-NAPHTHO[1,2-F] INDOLE-4-CARBOXAMIDE DERIVATIVES AS SELECTIVE GLUCOCORTICOID RECEPTOR MODULATORS



(57) Abstract: The present invention encompasses compounds of Formula I; or pharmaceutically acceptable salts or hydrates thereof, which are useful as selective glucocorticoid receptor ligands for treating a variety of autoimmune and inflammatory diseases or conditions. Pharmaceutical compositions and methods of use are also included.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/29494

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C07D 417/00, 231/44  
 US CL : 546/271.1; 548/369.1; 514/406, 277, 183

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 546/271.1; 548/369.1; 514/406, 277, 183

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
 STN, REGISTRY, CAPLUS, BEILSTEIN

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,349,558 A (BELL) 14 September 1982 (14.09.1982, see the entire document, especially compound of Formula I in column 1 and compound of Formula II in column 2.	1
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A		2-31
X	US 4,307,102 A (BELL) 22 December 1981 (22.12.1981), see the entire document, especially Formula I in column 1 and Formula II in column 2.	1
---		-----
A		2-31
Y	CA 1 178 965 (BELL) 04 December 1984 (04.12.1984), see the entire document, especially Formula I in claim 1.	1-6

Further documents are listed in the continuation of Box C.

See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

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**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US03/29494

**Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)**

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claim Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claim Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claim Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:  
Please See Continuation Sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-31 (in-part, as in Group I)

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

PCT/US03/29494

**BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING**

Group I, when K and J are N.

Group II, when K, J and L are C (no hetero group is present).

Group III, when K, J and L are C (hetero group is present).

Group IV, when K, J and L are N.

The inventions listed as Groups I to IV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

There are a number of combinations of the substituents of formula I and different cores with K and L are nitrogen, with K, J and L are carbon and K and J are nitrogen.

Furthermore, the substituent X can be a heterocyclic group. Each of them belong to different classes of compounds.

The inventions cited above lacks the same or corresponding special technical features.